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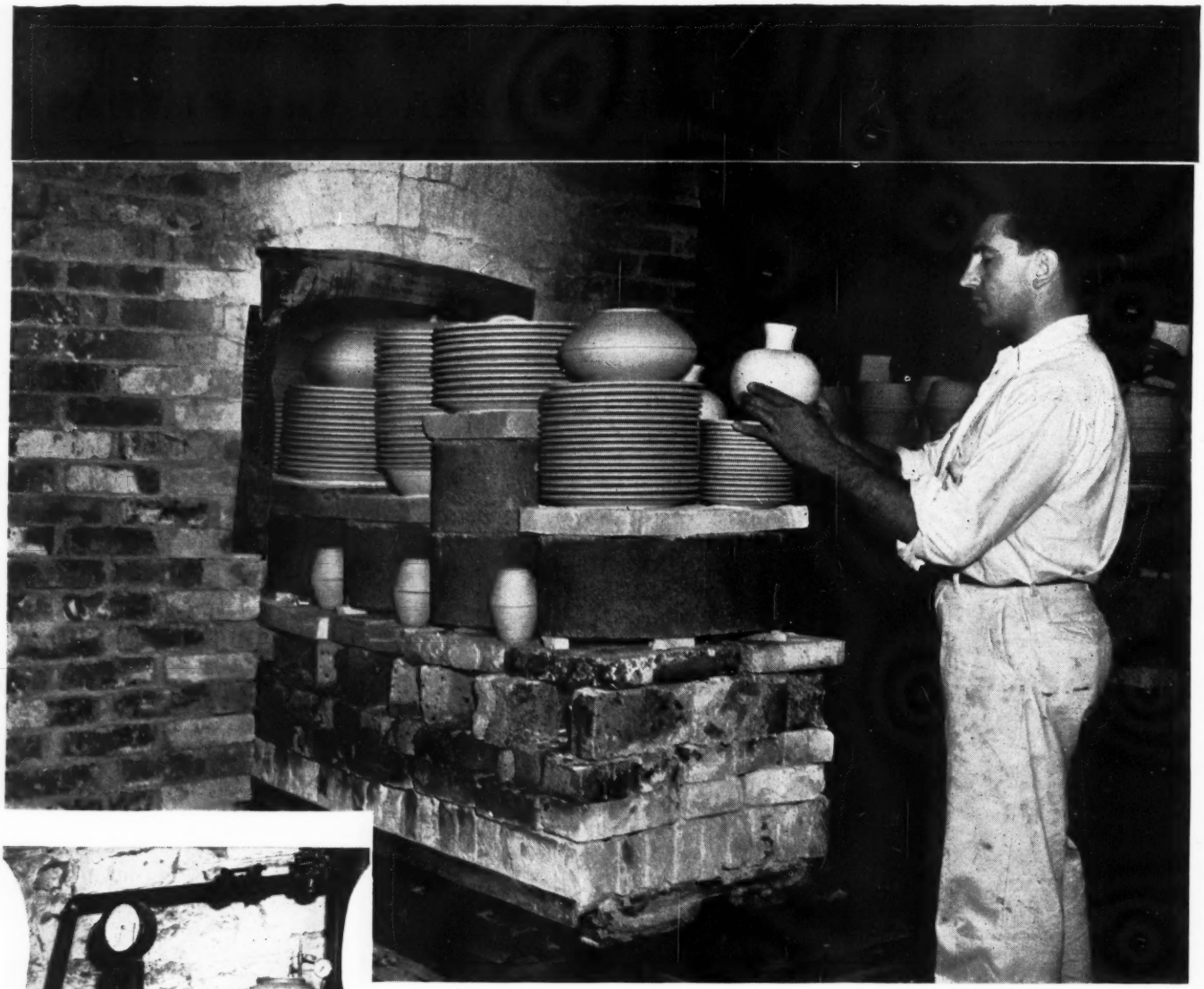

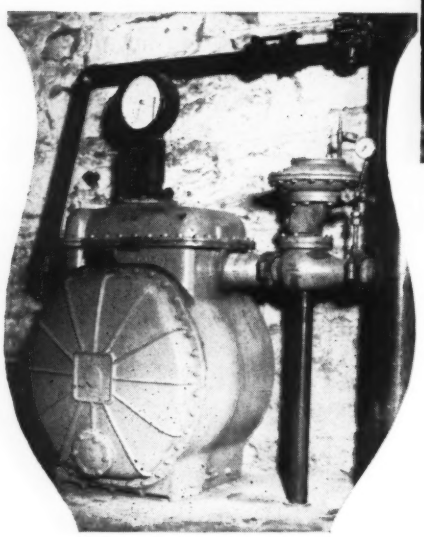

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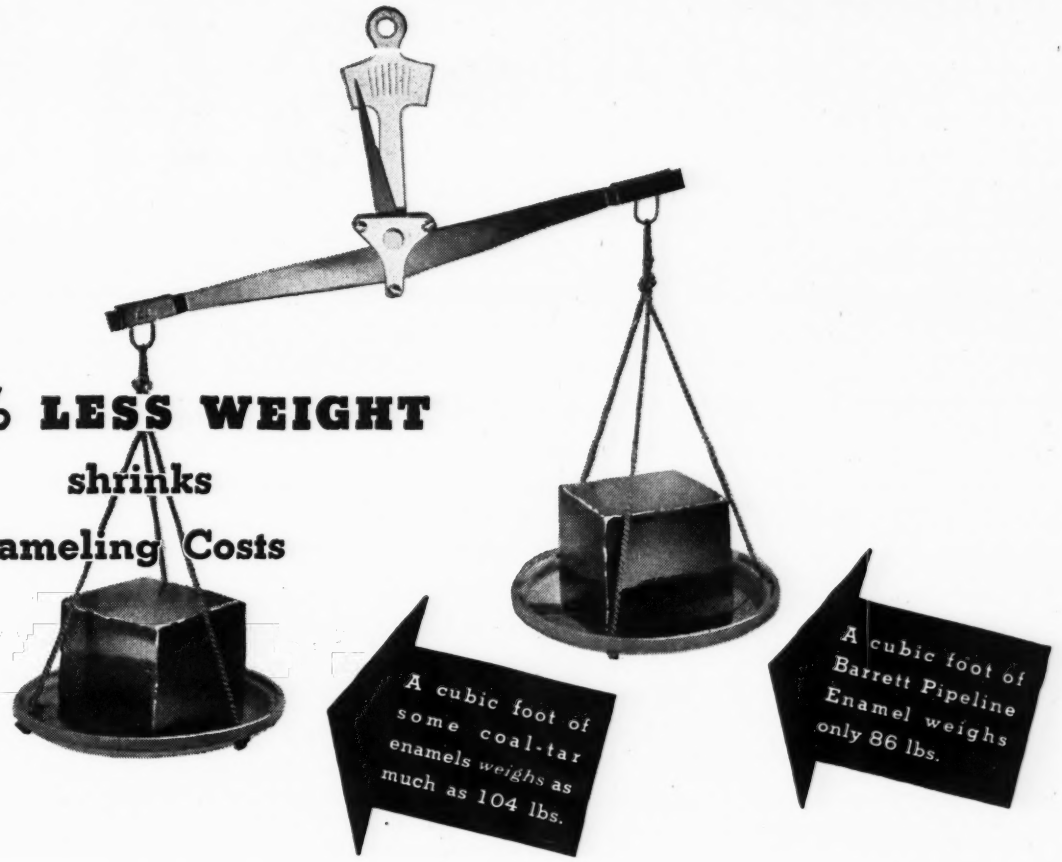

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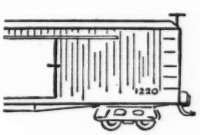

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Twenty-First Year of Publication

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Publication Office: **LOS ANGELES 14, California, 1709 West Eighth Street, DRexel 4337.**

Branches: **NEW YORK 17, 50 E. 42nd Street, MUrray Hill 2-4504; WASHINGTON, D. C., 306 National Trust & Savings Building, DIstrict 0215; CHICAGO 3, Illinois, 1064 Peoples Gas Building, HARrison 6634.**

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April, 1945. Volume XXI. Number 4. GAS is published monthly by Western Business Papers, Inc., 1709 West Eighth Street, Suite 320, Los Angeles 14, California. Subscription price: 25 cents the copy; two years for $3; $2 per year; Canada $3 per year. Entered as second-class matter August 20, 1936, at the post office at Los Angeles 14, Calif., under the Act of March 3, 1879. Member: Audit Bureau of Circulation; Associated Business Papers, Inc. Publishers: BUTANE-PROPANE News; Handbook BUTANE-PROPANE GASES; THE BOTTLED GAS MANUAL; WESTERN METALS.

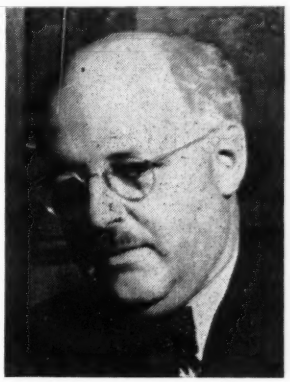
THERMALLY THINKING

By ELLIOTT TAYLOR, Washington Editor

New Tactics

THE last minute decision of the Federal Power Commission to postpone until "late summer or early autumn" its highly touted investigation of the natural gas industry opens up interesting vistas of speculation on the real motives behind that bland but precipitous announcement.

Of course it was notoriously apparent, as the May 1st deadline drew near that everybody was ready for the opening gong except the two principals in the main event—the Commission and the gas industry. At the time of the announcement of postponement the Commission was still combing its list of trial examiners to find someone to sit on the case, and its already swamped legal staff had been unable to obtain suitable special counsel to handle the legal details.



Elliott Taylor

In the absence of anyone to advise them, the commissioners were probably fingering through their notes trying to decide what form the investigation should take and who should be asked what questions and why.

Up to almost the closing date for the filing of intention to testify, practically all of the suggestions thrown into the hat had originated with the noisy opponents of natural gas expansion—the railroads, the coal and coke interests, a miners union, and the State of Louisiana. This galaxy constituted little more than a roster of the chronic intervenors in every gas pipeline or service extension application that the Commission has ever considered, and it may have been safely anticipated that they could offer little that the Commission hadn't heard before.

Not that the Commission is anything loathe to give the fullest recognition and encouragement to the anti-gas viewpoint. It would naturally regard the crystalization of that viewpoint into policy as a valuable aid in its bid for complete domination over every phase of natural gas operation. But at the same time also it must recognize that if its hearings are conducted in an atmosphere of partiality and prejudice, the cumulative force of the testimony taken will be vitiated by its own obvious improbity.

When and if the Commission does proceed with its investigation, it is naturally prepared to have the facts prove that only under the omniscient aegis of Washington can natural gas expand to the greatest benefit and comfort of society. But to be thoroughly convincing that conclusion must emerge surrounded by an aura of calm and dispassionate contemplation of all the facts, be they pro or con. And to achieve this something considerably more impartial than the testimony of Tom McGrath of the coal lobby is needed.

Toward the end of March it appeared on the surface that everything was set for as precise a proceeding as the Reichstag trial. Only one priceless ingredient was missing—an ingredient without which the whole affair could have degenerated into an unconvincing farce, and that was the assurance of some testimony by and in behalf of the defendant gas industry. The first round had cannily been scheduled for Kansas City, where there is a favorable press and a chamber of commerce that has already memorialized Congress in behalf of greater Federal control over natural gas production. Kansas also is the home of Governor Schoeppel, chairman of the Interstate Oil Compact Commission. The various compacting states have had their individual viewpoints regarding the FPC but with the one exception of Louisiana, all seemed to regard with misgivings its present determination to intrude on state jurisdiction in matters of oil and gas production. The Commission has been wooing Governor Schoeppel with bland and reassuring disclaimers of any intention to dominate the production of oil, and it may well be that the Kansas City setting was also designed to win the Compact Commission chairman over to that dubious viewpoint.

In the absence of any categorical suggestions from natural gas factors, it is not unfair to assume that the Commission was unable to even make up a proper agenda for the hearings. The old time-honored rate case technique whereby the defendant companies were obliged to present their evidence first so that it might later be torn to pieces could not be utilized. In the face of all these perplexing problems, the Commission must have greeted with genuine appreciation the request from representatives of conservation authorities of Kansas, Louisiana and New Mexico that the hearings be postponed.

It was indeed a graceful gesture of the Commission to thus accede to the request of these three states, particularly in view of the fact that it had brushed aside similar suggestions by the Department of the Interior and the Petroleum Industry War Council both of whom expressed concern lest an investigation at this time prove inimical and prejudicial to the war effort.

Speculation as to the real reason underlying the sudden

postponement must, of course, remain just that—sheer speculation. But of this much we feel quite certain: The Commission has neither abandoned its determination to seize control over oil and gas production from the states, nor postponed into any dim and improbable future the showdown battle on its plunge for power.

An investigation starting in the fall and dragging on as it inevitably must for a year or longer would mean that any recommended legislation for amending the Natural Gas Act would have to wait over for another session of Congress. It is unlikely that having gone this far the FPC is willing to risk the uncertainties of such a delay out of deference to the wishes of Kansas, Louisiana and New Mexico.

Far more plausible an explanation would be that a new political maneuver on the part of the Commission is now in the making. Certainly not an improbable explanation would be that a deal has already been worked out whereby friends of the FPC will introduce its own prepared amendments to the Natural Gas Act before the present session of congress with steering already arranged for to bring such a bill up for an early vote.

Under these circumstances it seems the better part of wisdom for the natural gas industry to lay its own plans so as to be prepared for any coup that the commission may contemplate. The industry must now be prepared to refute and controvert any misstatements or errors in fact that may be made not only before a commission examiner, but before a congressional committee as well.

A hands-off policy, however well it may be justified as respects the Federal Power Commission, will quickly degenerate into a head in the sand outlook if it is assumed toward any committee of the Congress. We have stated in the past and we reaffirm our conviction, that only at the hands of a special congressional committee, created for and empowered to thoroughly investigate not only the natural gas industry but the Federal Power Commission as well, can we see any prospect of an enlightened appraisal of the fuel problems of the nation.

We believe that preparation for any eventuality now calls for the creation of a top management committee that will enjoy the complete confidence of every association and every company in both the oil and gas industries. For if the oil men think this is to be just another natural gas battle, they are headed for a violent disillusionment, if the FPC is successful in establishing its jurisdiction over the producton of natural gas.

Natural gas men will do well to remember that the Natural Gas Act under which the Federal Power Commission first assumed jurisdiction over the industry was in a large measure the result of industry default.

The noose that was knotted losely about the industry's neck then is destined to be drawn together if the Federal Power Commission reaches its goal of complete control over natural gas. Yet we believe that the ultimate strangulation of initiative thus implied may yet be avoided. We believe that an industry devoted to the greatest public service of which all of its components are capable may still wage a successful fight for the right to perform that service.

There can be no item on the agenda of industry aspirations or hopes or plans for the future that can take precedence over this struggle now that the lines have been laid down. For on its outcome may well depend whether or not natural gas as a great and expanding factor in American life is entitled to entertain any aspirations, whether it may have any hopes and whether it is to enjoy any future other than that which political whimsy may decree.

Coal Capers

THE pick handle political seasons is in full swing again, and the coal miners and the miner owners are preparing to work out their differences of opinion in full view of their shivering and unhappy clients, the general public.

As a chronic objector to every project for the extension of natural gas, it is only fitting that the coal industry's record for keeping its own house in order be held up for scrutiny in a little better reading light than gleams from a miner's lantern.

A graph of the number of strikes called in the combined hard and soft coal industries during the past six years is hardly a curve at all—it looks more like a vertical line with just enough lean to it to get by by a chilly heating season when the miners must at least dig enough coal to keep their own meeting rooms warm and take the chill out of the air in their employers' board of directors' rooms.

In 1938 there were 44 work stoppages, with a loss in man hours of 490,709. The year that followed saw 50 strikes; the year after that 59; then 102; then 127 and finally in 1943, the last year for which all of the sorry details have been tabulated, there were 430 strikes for a loss of 9,346,881 man hours. The figures for the years 1938 through 1941 are from the Department of Commerce and those for 1942 and 1943 have been furnished by the Bureau of Labor Statistics of the U.S. Department of Labor.

During all of this time and up to the present there has not been one major interruption of natural gas service due to labor and management controversy, or for that reason due to any other controversy.

It has long been a matter of profound sorrow to us that natural gas enjoys such a singular lack of appreciation among the rank and file of coal men. Instead of recognizing it as a good substitute fuel that would release both labor and management from the necessity of interrupting their strikes to produce occasionally a little coal for the nation's homes and factories and perhaps some for the war effort, miners and owners alike are united in a sort of snarling opposition that makes itself manifest in mean and unappreciative acts.

Sometimes they get out tabloid newspapers which they pass out among themselves and occasionally are able to place in the hands of lay readers. A classic of rare quality, a collector's item that would be well worth reproduction in its entirety were it not for the paper shortage, was such a sheet recently distributed around Milwaukee. We learned from it that death and disaster stalk the route of every gas transmission line and that there can be no more dangerous a task in household operation than that of lighting the front burner on a cook stove. Laying the paper aside we were haunted by visions of natural gas users being blown to the atmosphere like roman candles and falling to the earth with the monotonous regularity of rain on a circus tent.

We propose an accord with the coal industry: Let them get on with their strikes, devoting all of their time and energy to that particular phase of industry operation that both sides seem to find the most enjoyable, and natural gas will furnish the substitute fuel that their flair for fratricide makes necessary.

WOMEN COMMANDOS, a radio program produced and directed by Miss Julie Benell for Oklahoma Natural Gas Co. and designed for women on the home front, recently conducted a 10-day Radio Clinic on the "Returned Service Man" featuring exclusive interviews by Miss Benell with top ranking military and civilian authorities on this timely subject. The "Clinic" was broadcast over WKY, Oklahoma City, in 10 consecutive WOMEN COMMANDO programs January 29 through February 9, 1945.

About the first of the year, when casualty lists started mounting and discharged service men began returning to civilian life at the rate of about 30,000 per month, Miss Benell sensed a tremendous public interest and a complete lack of public information concerning the problem of rehabilitation of service men, particularly those with physical disabilities or nervous disorders.

JULIE BENELL, Producer-Director of WOMEN COMMANDOS, daily raido program sponsored by the Oklahoma Natural Gas Company, interviews Major-General Norman T. Kirk, Surgeon-General of the United States Army. His interview was transcribed in Washington for the first of a series of 10 programs constituting the WOMEN COMMANDOS Radio Clinic on the Returned Service Man.

By M. H. NORTH

Advertising and Sales Promotion Manager, Oklahoma Natural Gas Company

Miss Benell felt that the job and the responsibility for helping the returned service man to make the difficult adjustment from military to civilian life would fall largely to the woman in the home—the wife or mother of the service man, or the woman who lives next door. She proposed a series of programs to educate women in Oklahoma to the problems that would be posed by the return of their men and the best way to meet those problems.

Washington Takes Interest

So that Miss Benell might get the most authoritative information for these programs, Oklahoma Natural arranged for her to go to Washington to present her plan to military authorities, to get their approval and, through personal interviews, their advice and counsel to women at home.

Miss Benell was welcomed enthusiastically when she presented her plan and was accorded every courtesy and cooperation by the Surgeon-General of the Army and other top ranking military men. It seems that these men had given much thought to the growing problem of returning men from military services to civilian life, but they realized that after a man's discharge, the problem became one that must be solved by civilians. The military services can prepare a man for his return while he is still in service, but they cannot help him with his readjustment after he gets home. Thus, the "radio clinic" proposal for educating the women in the home was right in line with current thinking in Washington.

Surgeon-General Norman T. Kirk told Miss Benell, "I think this is the most forward thinking idea that has been put into effect on this vital subject of the returned service man. I shall be greatly interested in following the progress of this 'Radio Clinic', and knowing how Oklahoma women receive this information."

Miss Benell returned to Oklahoma with exclusive personal interviews with military medical authorities, tops in their respective lines, transcribed especially for WOMEN COMMANDOS.

To these Washington interviews she added interviews with other outstanding authorities, and on January 29 she started the WOMEN COMMANDOS Radio Clinic on the Returned Service Man—a series of 10 consecutive programs, as shown in the Table on the following page.

State Officials Cooperate

The "clinic" was opened with a special 15-minute studio "kick-off breakfast" immediately preceding the regular WOMEN COMMANDOS program. The breakfast was given by Radio Station WKY which recognized the broad aspects of the "clinic" as an important public service.

The breakfast and broadcast was attended by 75 guests, consisting of Governor Kerr, representatives of city and town governments and civic organizations, representatives of the Army Eighth Service Command, military officers of various Oklahoma military establishments, representatives of veteran organizations, the Press and other interested groups and agencies, as well as President Joseph Bowes and other officials of the Oklahoma Natural Gas Co.

In the preliminary broadcast, Governor Kerr, Mayor Heflin of Oklahoma City, and Major Auld, Public Relations officer of the Eighth Service Command, complimented WOMEN COMMANDOS and the Oklahoma Natural Gas Co. on its public spiritedness in presenting the "clinic", and President Bowes responded for the Gas Company. The regular program

SERIES OF TEN RADIO PROGRAMS ON THE RETURNED SERVICE MAN

	Guest	*Subject of Interview*
1.	Major-General Norman T. Kirk, Surgeon-General, U. S. Army	"The Disabled Man"
2.	Major-General Joe N. Dalton, Chief of Personnel, ASF	"Care of the Service Man While in Service"
3.	Mrs. Edyth Thomas Wallace, Nationally known columnist and Home Counsellor	"Mother's Adjustment For Her Children"
4.	Charles Schlink, a returned veteran, and Veteran Coordinator for the Caterpillar Tractor Company	"G. I. Joe's Viewpoint"
5.	Governor of Oklahoma, Robert S. Kerr, and Mr. Milt Phillips, Chairman of State Rehabilitation Program	"Oklahoma's Rehabilitation Program"
6.	Colonel William Menninger, Chief Neuropsychiatry, Office of Surgeon-General	"The Psychoneurotic Man"
7.	Colonel E. C. Gentry, Commanding Officer Borden General Hospital, Chickasha, Oklahoma	"The Deaf Casualty"
8.	Dr. George L. Cross, President, University of Oklahoma	"Educational Facilities for Returned Service Men"
9.	Brigadier-General Elmer E. Adler, Chief, Management Control, AAF	"Care of Men of Army Air Forces"
10.	Lieutenant-General W. D. Styer, Chief of Staff, ASF	"Summation of the Clinic"

followed immediately with the transcribed interview with Surgeon-General Kirk, the first of the 10 "clinic" broadcasts.

The public response to the "clinic" exceeded our wildest expectations. On the last two programs of the "clinic", Miss Benell announced briefly that digests of the information contained in the 10 clinic programs in booklet form were available to those who requested them.

On the third day 3200 requests had come in. The requests are still coming in and they now number well over 11,000.

Study Kit for Women's Groups

We also offered a "study kit" to women's groups who wished to study the information presented in the "clinic." This kit consisted of sets of radio scripts of the 10 "clinic" programs, and a suggested plan for presenting the material to the group in "skit" or studio broadcast form. It was suggested to the group that the parts in each script be assigned to members of the group to read, and other suggestions were made for dressing up the meeting to produce a radio studio atmosphere and a realistic reenactment of the broadcast.

Following the meetings, the scripts were kept by the group and circulated among the members who wished to read them. Over 500 of these "study kits" have been sent to women's groups.

The entire "clinic" project is a radio "first" for WOMEN COMMANDOS and the reaction in Oklahoma is being watched very carefully in Washington with the idea of possibly duplicating the "clinic" program on a national scale, as an educational measure which will be an effective aid to reabsorbing our service forces into civilian life.

Following the 10-day "clinic", Miss Benell is continuing to present various phases of the rehabilitation of returned service men, devoting one program a week to that subject. A number of interesting interviews have been arranged for these follow-up programs, and in response to numerous requests, Miss Benell is repeating certain of the original 10 programs.

We are particularly pleased with the phenomenal response to the "radio clinic" and the fact that we have been able, through WOMEN COMMANDOS, to make another timely contribution to the war effort and the public interest. The "radio clinic" was easily the high spot in the many wartime projects and activities in which the program has participated.

After 29 months of sponsorship of WOMEN COMMANDOS, we are satisfied that our venture into a non-commercial, public service type of radio program has earned for the Company a degree of public approval and good will that we could not have achieved in any other way in the same period at the same investment.

Wisconsin Commission Issues Gas Study

BULLETIN No. 5B, just issued by the rates and research department of the Public Service Commission of Wisconsin, presents a continuation of a 12 year old series of studies covering revenue and consumption data of Class A and B gas utilities which retail gas to ultimate consumers in Wisconsin.

The study covers data for 1943 with some comparative figures for 1941 and 1942 included, embracing intrastate gas sales in Wisconsin for Class A and B gas utilities, which account for 98.3% of total gas operating revenues in serving 99.2% of the general consumers.

There are 104 incorporated communities in Wisconsin of at least 500 in population which have utility gas service. Of these, 91 are served by Class A and B utilities. All the communities which have populations of 7500 or over have gas service available. At the present time there is no municipality in the state which operates its own gas system.

Utility	*Per cent Sales, 1943*
Milw. Gas Light Co.	48.5
Wisconsin Gas & Elec. Co.	14.0
Wisc. Public Service Corp.	9.5
Wisc. Power & Light Co.	7.2
Madison Gas & Elec. Co.	6.3
Northern States Power Co.	4.1
Sup. Water, Lt. & Pow. Co.	1.9
Wisconsin Mich. Pow. Co.	1.9
Wisc. Fuel & Light Co.	1.2
Wisc. Southern Gas Co.	1.1
Wausau Gas Company	.9
All other gas utilities	3.4

Distribution of total gas sales to ultimate consumers in the state during 1943 between the various utilities is shown in the summary.

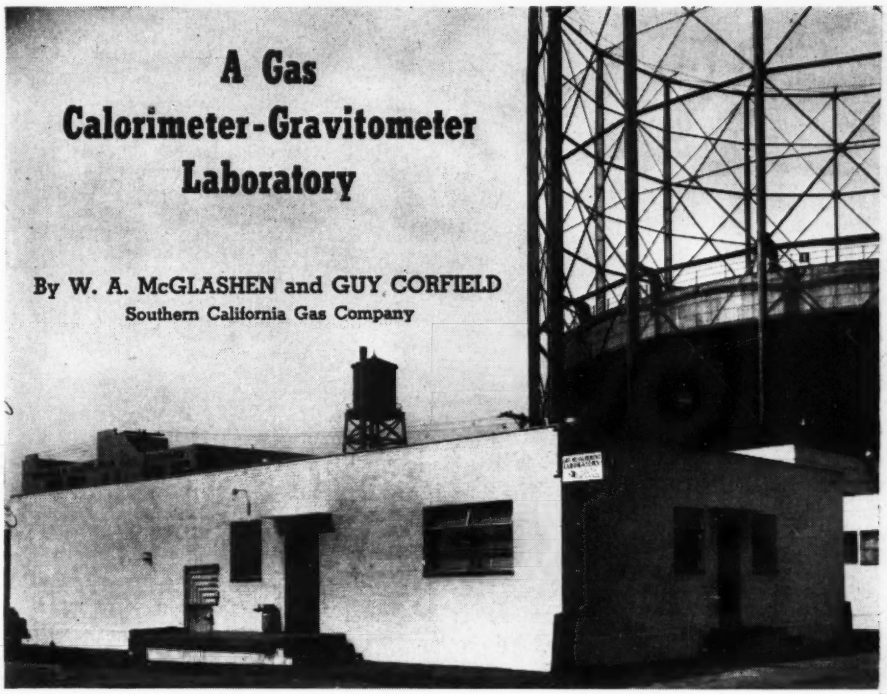
Total revenues and MCF sales to ultimate consumers of Class A and B gas utilities have increased each year since 1938. The upward trend, however, was not applicable to all classes of service; residential service in 1939 and in 1941 and commercial service in 1943 experienced declines. Spaceheating service has had the greatest percentage revenue increase since 1938 (200%) followed by industrial service with 143%.

Average revenue per customer ratios range from $25.22 for the Milwaukee Gas Light Co. to $34.55 for the Lake Superior District Power Co., the average for all of the Class A and B utilities being $27.21.

In spite of the almost complete stoppage of the manufacture of appliances, curtailment in connecting new customers, and, for the most part, the prevalence of pre-war rates, average use and revenue per customer of residential service continues to increase in Wisconsin.

A Gas Calorimeter-Gravitometer Laboratory

By W. A. McGLASHEN and GUY CORFIELD
Southern California Gas Company



THE PHOTOGRAPH at left (Fig. 1) shows the new gas measurement laboratory built specifically by Southern California Gas Company for the operation, repair, calibration and maintenance of gas calorimeters and gravitometers and their auxiliary equipment. Facilities are provided also for the distillation and cleaning of mercury as used in orifice meters and other instruments.

IN operations of the Southern California Gas Company, the greater part of the work in connection with gas heating value measurement, and gas specific gravity determinations as required for orifice meter coefficients for volume measurement purposes, is handled by the Gas Measurement Laboratory of the Research Department. Inasmuch as the company's transmission and distribution lines traverse an area of some 13,000 square miles, and gas is received into the system from numerous sources, including some 26 oil fields and several standby gas manufacturing plants, an appreciable volume of this type of work is necessary to furnish adequate data for gas quality record, and volume measurement. This requires the use of a considerable number of both recording and indicating instruments, installed at both central and outlying stations.

Recently a new central Gas Measurement Laboratory building was constructed, designed specifically for the operation, repair, calibration and maintenance of gas calorimeters and gravitometers and their auxiliary equipment. Space was also furnished for the distillation and cleaning of mercury as used in orifice meters and other instruments. An attempt was made to provide the most efficient and convenient facilities for these several types of work, and it is thought that a general description of this laboratory, and detail of some of the special features, may be of interest to the industry.

General Building Arrangement

The exterior of the laboratory is shown in Fig. 1. A platform is provided for loading and unloading light trucks. The floor plan and general layout is indicated in Fig. 2. It will be noted that there is approximately 300 sq. ft. of office space, 980 sq. ft. of shop area, 680 sq. ft. in the instrument room, and 220 sq. ft. assigned to storage, air conditioning apparatus, and mercury room. Washroom, locker room, shower stalls and a dressing room are also provided for the laboratory personnel and other employees, in a connected structure. The air conditioning apparatus, a 5-ton Servel All Year Air Conditioner, supplies heat or cooling effect to the instrument room only, the remainder of the laboratory being heated by steam radiators. The building is of substantial brick and concrete construction.

Instrument Room

The term instrument room has been applied to that portion of the building containing the operating instruments, both indicating and recording. This room has two outside walls of brick with inside plaster and air space between, providing good heat insulation; and the two inside walls, and ceiling, are heat insulated with a 3-in. rock wool blanket. The interior is automatically heated or cooled by the Servel apparatus already mentioned, to maintain any desired constant temperature to a precision such that a metal-bulb recording thermometer placed in the room will produce a smooth and perfect circle chart.

Fig. 3 is a view of the instrument room taken from the northeast corner. In this picture are shown, from left to right: a monel-metal distilled water storage tank from which "make-up" water is supplied to the several recording calorimeter tank units; a water-flow calorimeter assembly, above which is mounted a 180-gal. copper water storage tank equipped to supply water at room temperature to the water-flow calorimeter assembly; a recording calorimeter assembly; a specially-designed bench with back panel on which is mounted three recording gravitometers with their gas supply manifolds and pressure controllers; and another specially designed bench carrying a gas density balance, with back panel supporting its gauges and control manifold. Each instrument or bench is mounted on a concrete mat raised two inches above the general floor level.

A novel feature is an "elevated trench" built entirely around the inside edge of the room, to contain but at the same time conceal all gas and water piping, electric wiring, etc. This trench is shown in Fig. 4, running along the wall behind a recording calorimeter. A water tap protrudes from the trench at this point, and a floor drain can be seen below the tap. All connections to the various instruments in the room are made through openings in the side of this trench

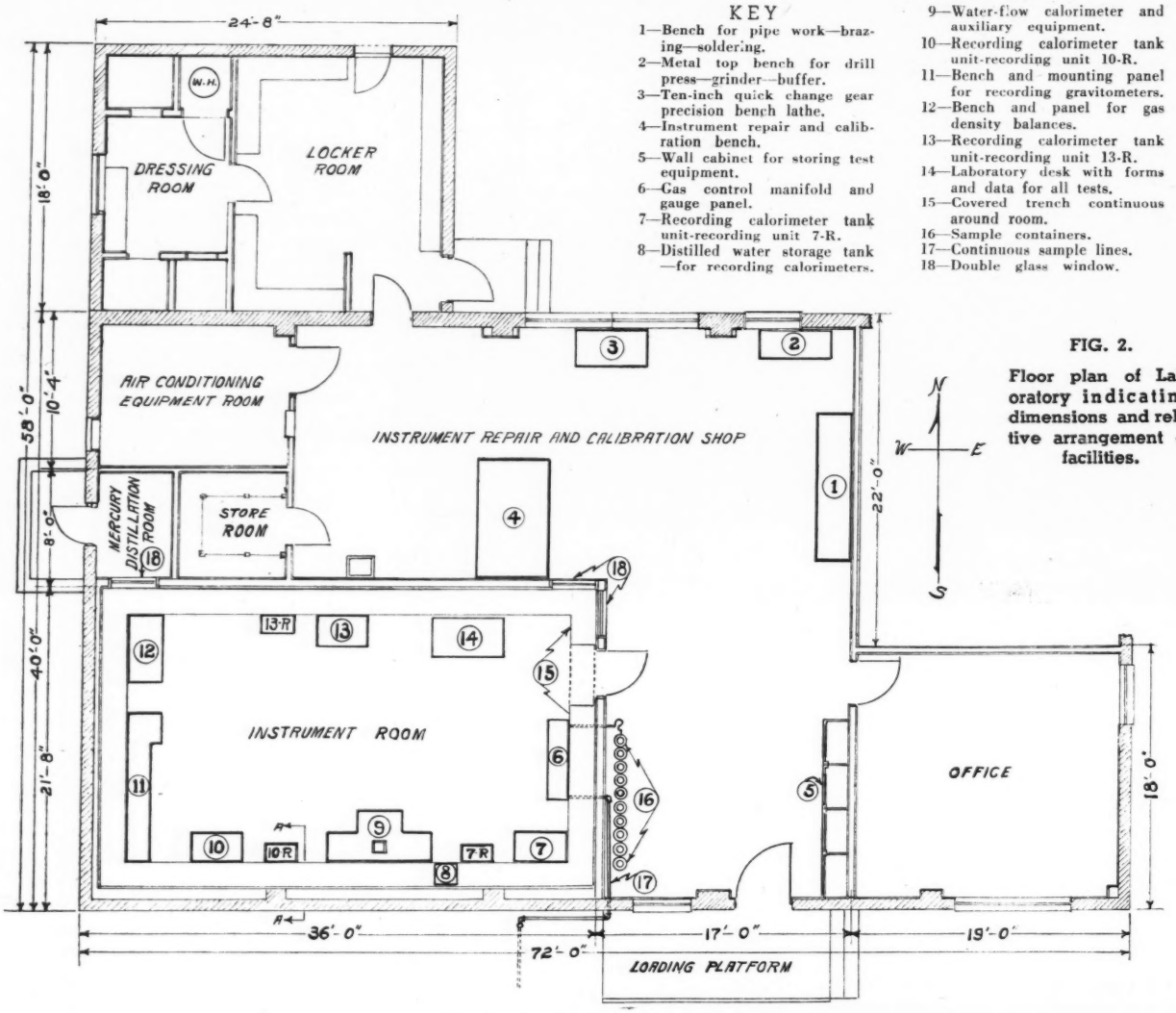


FIG. 2.

Floor plan of Laboratory indicating dimensions and relative arrangement of facilities.

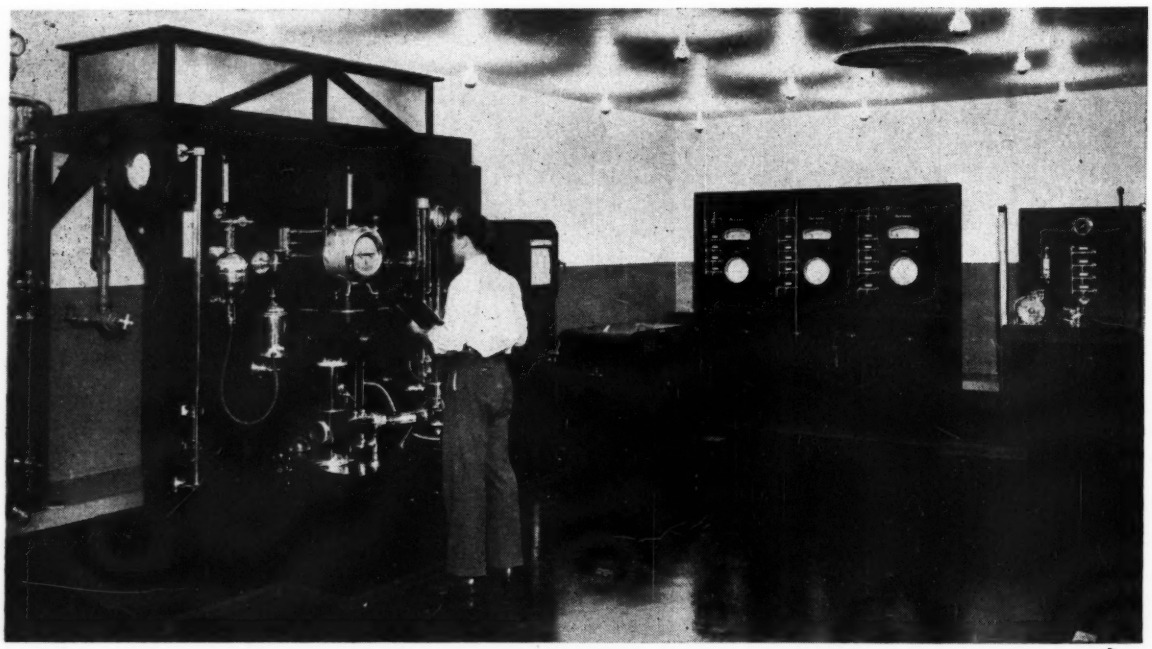


FIG. 3. Instrument room viewed from northeast corner, showing (from left to right) a distilled water tank, a water-flow calorimeter assembly with overhead water tank, a recording calorimeter assembly, a three-instrument recording gravitometer assembly, and a gas density balance assembly.

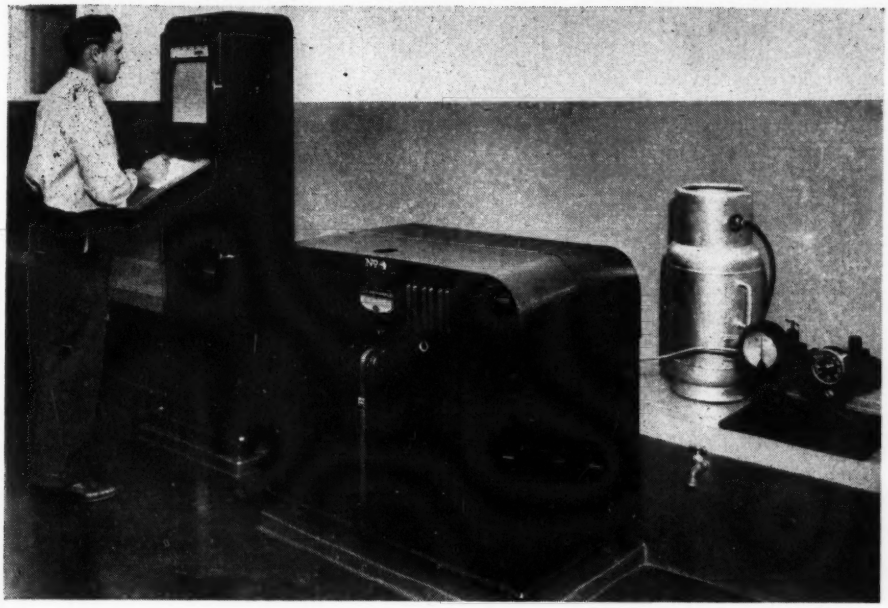


FIG. 4. Showing method of introducing sample from portable container to recording calorimeter; also showing "elevated trench" running along wall at back of instrument.

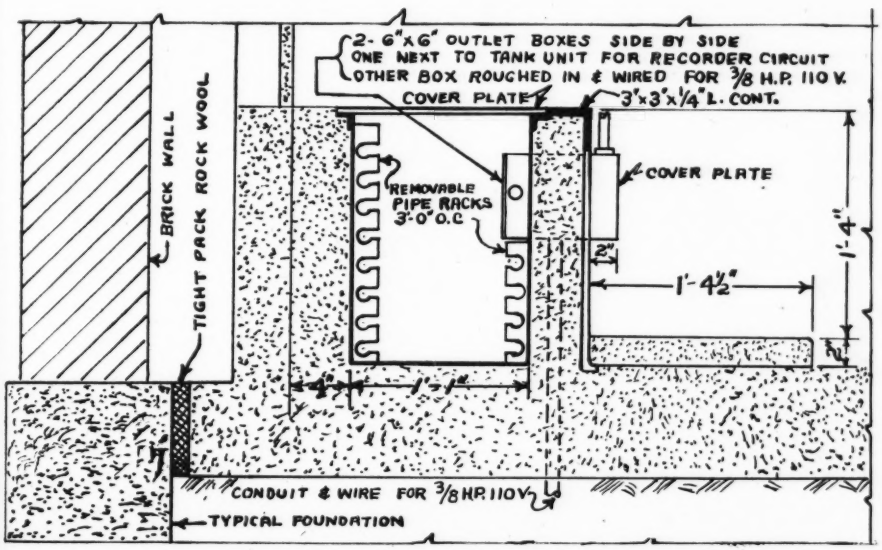

2-6"x6" OUTLET BOXES SIDE BY SIDE
ONE NEXT TO TANK UNIT FOR RECORDER CIRCUIT
OTHER BOX ROUGHED IN & WIRED FOR 3/8 H.P. 110 V.
COVER PLATE
3"x3"x1/4" L. CONT.
BRICK WALL
TIGHT PACK ROCK WOOL
REMOVABLE PIPE RACKS 3'-0" O.C.
COVER PLATE
2"
1'-4 1/2"
1'-4"
CONDUIT & WIRE FOR 3/8 HP. 110V.
TYPICAL FOUNDATION

FIG. 5. Section A-A of Fig. 2, showing structural details of "elevated trench" which carries all services to and from instruments.

TABLE 1. FEATURES OF THE MERCURY ROOM

1. Only one entrance, from outside of building.
2. Clear glass window in door, to permit view of interior.
3. Outside emergency shut-off, so that gas to distillation unit can be turned off and unit allowed to cool before entry of operator.
4. Double-pane window to permit view of interior from instrument room, with additional emergency gas shut-off in instrument room.
5. Forced fan ventilation through ceiling and roof to outside.
6. Sheet iron covered bench, with sheet iron turned up around entire periphery to confine spillage; bench top sloped from all directions to catch-pot so that all spilled mercury will run to catch-pot and can be drawn off underneath.
7. Bench supported from walls, to eliminate legs to floor that would interfere with floor cleaning.
8. Floor of smooth painted concrete, with rounded edges and corners to facilitate cleaning and avoid accumulation of mercury in cracks and corners.
9. Raised threshold at door, to prevent escape of spilled mercury.
10. Floor sloped from all directions to small sump under bench, so that all spilled mercury will run to sump and can be recovered.

back of each instrument; incidentally, this trench runs underfloor at the door to complete the circuit of the room. Fig. 5 is a cross section of this trench which shows its most important structural details.

Gas supply to the various instruments either enters the building in piping at "inches of water" pressure, or in sample containers. From either source of supply, the gas sample is piped through the instrument room wall (to the left of the door) into a manifold as shown in Fig. 6. From this manifold it passes into the piping (3/8 in. copper tubing) in the trench. This arrangement of gas entry to the instrument room, manifold, and trench piping, allows any gas sample to be fed to any instrument or any combination of instruments by manipulation of the manifold valves. The manifold (Fig. 6) consists essentially of interconnected ½-in. horizontal and ¼-in. vertical runs of piping, with needle valves between each horizontal run and each vertical run. Each horizontal run corresponds to a gas "sample", and each vertical run is connected to an instrument assembly. Any desired routing of gas can be done by manipulation of the needle valves. The pressure gauges along the top of the manifold (0 to 60 in. of water pressure) indicates the pressure of the gas sample as it flows through the vertical run to any particular instrument assembly.

Gas Supply to Instruments

To insure a rapid and "fresh" supply of gas to each instrument, particularly when such gas comes in piping from a considerable distance, each ½-in. horizontal run (incoming sample line) is purged into the 3-in. pipe which serves as the left-hand vertical frame of the manifold, through a plug cock and orifice plate. This 3-in. exhaust line discharges to a low pressure (10-in. water) header in the plant yard. Thus the rate of flow through any incoming sample line can be adjusted to provide any instrument with a sample of gas representative of the source of sample regardless of the length of sampling line or gas consumption by the instrument or instruments.

In the case of a small gas sample, or in special checking and calibrating work, any instrument can be disconnected from the trench piping and fed directly from the sample container. This operation is indicated in Fig. 4, where a recording calorimeter is receiving gas from a small sample container through a pressure reducing assembly.

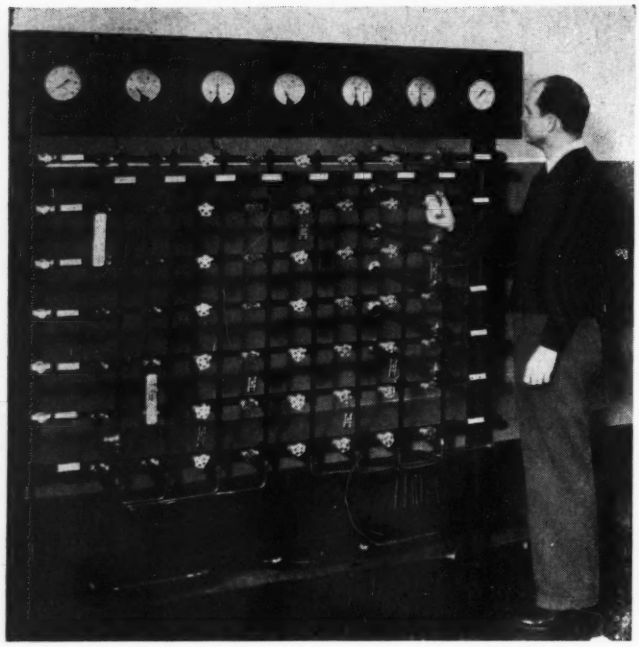


FIG. 6 (At Left).

Sample control and distribution manifold, permitting any sample to be routed to any instrument through piping in trench.

FIG 7 (Below).

Mounting of recording gas gravitometer, with gas supply manifolds and special pressure control "bubbling bottle."

or on to a truck for transport to outlying stations. The shop is equipped with work bench, small lathe and other machine tools, storage cabinets, etc.

Mercury Room

Another specially designed feature is the mercury room for distilling, washing and storing mercury used in orifice meters and other instruments.

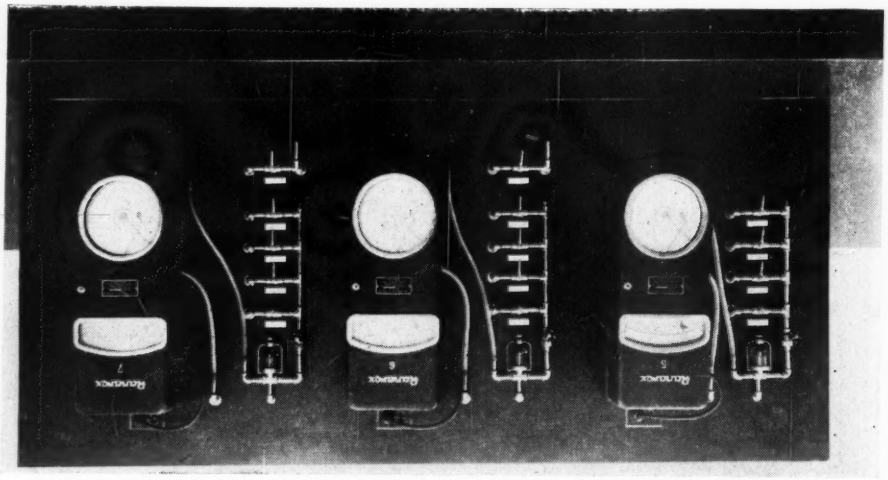
If mercury has become amalgamated from contact with copper or brass, it requires distillation; otherwise, it can usually be cleaned by an acid and water wash. Inasmuch as mercury may be detrimental to health if escaping as vapor, or lying in the finely divided state on bench or floor, every precaution has been taken to adequately ventilate the room and confine or recover spilled mercury. The mercury room has the following features as shown in the Table.

As an additional gas sample distributing feature, all the gas lines in the trench have an offtake through the wall of the instrument room to a calibration bench, in the shop. This calibration bench and the area immediately adjacent to it is for the purpose of repairing and adjusting instruments brought in for overhaul, and through this special piping arrangement these instruments under repair can be supplied with gas, the heating value or specific gravity of which is known from the recorder charts in the instrument room.

Fig. 7 gives details of the recording gravitometer assembly already shown in the background of Fig. 3. To the left of each instrument, at the top of the manifold, is seen a pressure control and relief to insure that gas is fed to the instrument at constant pressure. This device consists essentially of a branch of the gas supply piping, dipping a set distance into low-vapor pressure oil, with supply adjusted so that there will be slow bubbling through the oil. the surplus bleeding to atmosphere. The manifold below the "bubbling bottle" is for entry from the various gas lines in the trench. Gas exhausted by these instruments is purged to atmosphere above the roof, through concealed piping.

Shop Space

The shop includes the calibration bench, already described, and shown in Fig. 8. In the right foreground of Fig. 8 is a specially built truck, or carrying frame, by which the heavy recording calorimeter tank units can be raised and moved around the shop,



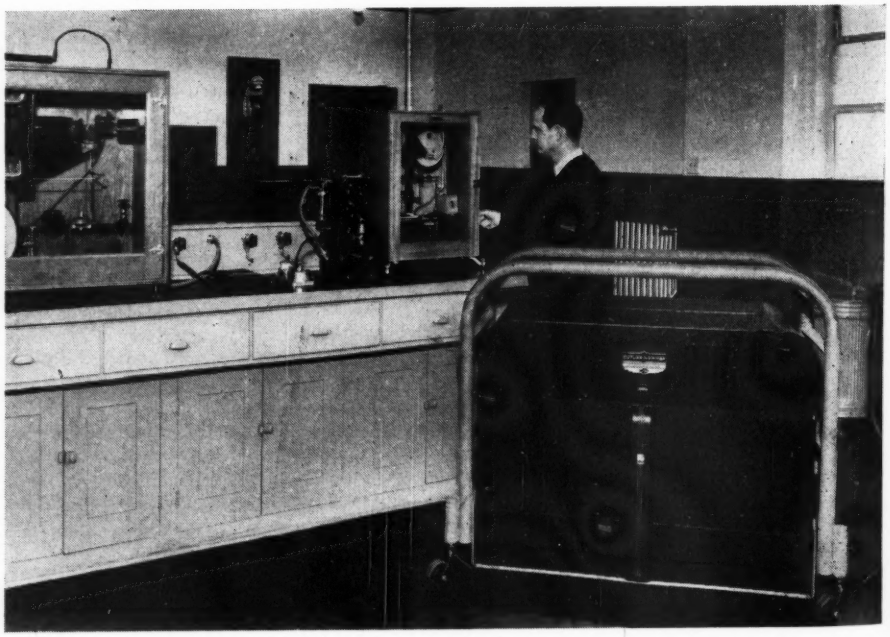


FIG. 8. View of portion of Shop, showing Calibration Bench and specially built carrying frame for tank unit of recording calorimeter.

Versatility of LP-Gas as a Substitute Fuel

JOHN CAMPBELL, general superintendent, Hamilton By-Product Coke Ovens, Ltd., Hamilton, Ontario, Canada. From a paper, "Propane—The Sulpha Drug of the Gas Industry."

THE United Fuel Investments Limited is a small holding company, distributing natural and manufactured gas to an area in the Canadian province of Ontario having a population of approximately 250,000 people. The Company has 17,000 natural gas customers and 23,000 manufactured gas customers, the districts being entirely separated. The natural gas is purchased from two natural gas companies and the manufactured gas is produced in the plant of the Hamilton By-Product Coke Ovens Limited.

At the beginning of the war there was ample natural gas for our natural gas needs, and there was a surplus of coke oven gas for our manufactured gas district. The war changed the situation materially. Due to the shortage of coal, or at least the anticipated shortage, our heating load increased considerably and at the same time our industrial load increased by leaps and bounds. The oil situation aggravated the condition and this being a large manufacturing district, it was necessary to make plans for the future. At the beginning of the war our manufactured gas capacity consisted of 25 Semet-Solvay ovens and 35 Wilputte ovens. In rapid succession, we made the following additions to our manufactured gas capacity:

1. A line was laid from a neighboring steel company to take their surplus coke oven gas when available.

2. A carburetted water gas set operated with heavy oil was installed.

3. Mechanism was provided to add heavy oil to the coal charged to the coke ovens.

4. A line was laid to the above steel company through which we purchased blast furnace gas. (Note: The purpose of this gas was to cut the Btu of the coke oven gas down to normal since the addition of the oil to the coal carburetted the coke oven gas to well over 590 Btu. Moreover, this blast furnace gas was needed to mix with propane to give us a gas of such Btu. value that it could be used for underfiring our coke ovens).

THE PHOTOGRAPH above shows a gasoline plant which has recently been completed, by the Natural Gasoline Corporation and Humble Oil & Refining Company, in the Hawkins Pool, Wood County, Texas. This plant, utilizing all available material from two plants which were dismantled, was designed to process 15,000,000 cu. ft. of gas per day, with atmospheric pressure at the field separators and 6 in. vacum at the plant.

The gas is compressed to 200 lbs. gauge in two stages with 5600 hp. angle type, compressor engines.

An average daily production will approximately show—

Propane	14,500 Gals.
Butane	14,000 Gals.
Iso-Butane	12,000 Gals.
Iso-Pentane	6,000 Gals.
8.9#RVP Gasoline	15,500 Gals.
TOTAL	62,000 Gals.

5. Fifty-four Curran-Knowles ovens were erected.

6. Six 10 ft. Galusha producers were erected to underfire these 54 ovens.

On our natural gas system the following events occurred also in rapid succession:

1. Our natural gas requirements began to exceed the quantity of gas which we were able to purchase from the natural gas producing companies, and it was necsary on peak days to cut off factories using natural gas.

2. Some few factories using natural gas were changed over to manufactured gas, since our manufactured system was in a better position than the natural system.

3. An order was issued by the Canadian Government which stated that we must remove all conversion central heating equipment and this was complied with; the result being the removal of well over 1200 conversion heating burners.

4. Propane storage to take care of our winter load, together with all appurtenances, was installed.

5. An extra boiler to evaporate the propane, and to furnish steam for a new pump to distribute the mixed gas, was installed.

After consulting with the natural gas companies and taking into consideration the climatic conditions, it was decided to put in rather a large storage for propane. We decided on 13,600 feet of 24-in. pipe installed in 650 ft. lengths, which pipe had a capacity of 310,000 U. S. gallons of propane when filled. Since most of this propane was brought in during the cooler weather, we at times filled the storage up to as high as 95% of its ultimate capacity.

The storage was put in primarily to take care of peak natural gas re-

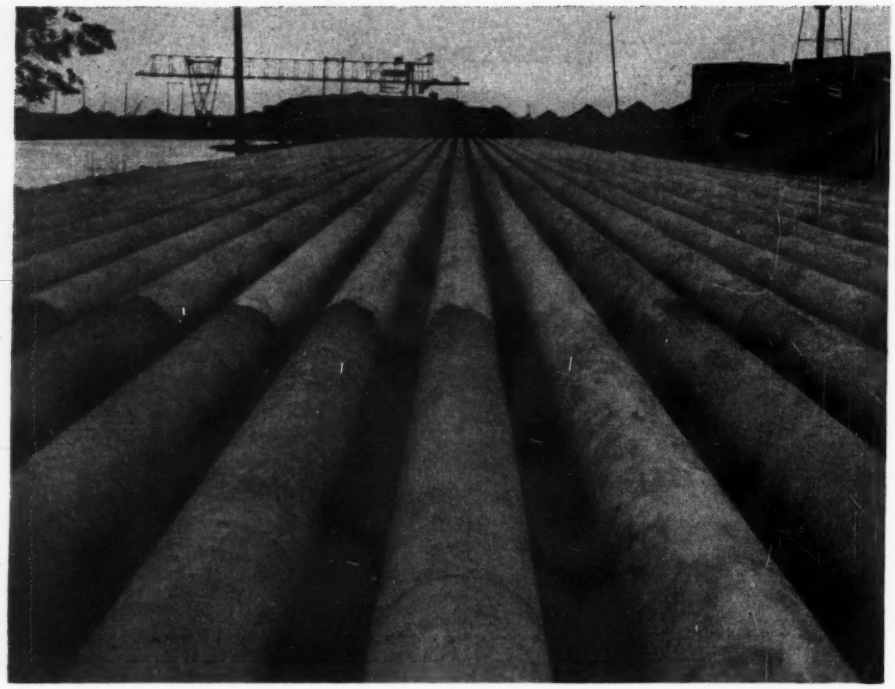


FIG. 1. Liquefied petroleum gas storage tanks, 650 ft. long.

quirements for approximately 20 days per year, but the natural gas requirements of the producing companies themselves increased to such an extent that during the past winter, in the city of Hamilton proper, no natural gas was available and this storage provided all gas for approximately 15,000 customers. In other words, 15,000 customers used pure natural gas for approximately five months, then used a propane-coke oven gas mixture for another five months and in between times used varying quantities of natural gas mixed with the propane mixture.

As far as we have been able to learn, this is the only case where there was a direct and prolonged substitution for natural gas. When we say substitution, we do not mean using a mixture "to get us over the hill" on peak days.

Tests in our laboratory showed that a mixture of propane and air could be substituted for natural gas; a mixture of propane and blast furnace gas could also be substituted, but, if anything, the propane-air mixture was the better of the two. The Btu. of the gas to be distributed with this mixture, however, was too high, and while these mixtures would "get us over the hill" during peaks, they were not economical for sustained substitution.

Since we had various methods of producing manufactured gas in the process of construction, and were hoping to have a surplus of such gas, we decided, after much calculation and laboratory experimentation, to distribute a propane-manufactured gas mixture.

The high percent of hydrogen in the coke oven gas, when mixed with propane, gave an amazing range of gases which could be substituted directly for natural gas. Our natural gas has a Btu. value of 1040 and a gravity of .64. A mixture of 25% propane and 75% coke oven gas gave us a gas having a Btu. value of 1030 with a gravity of approximately .70. The gravity and the Btu. of both gases were so nearly alike that the service was well-nigh perfect. The flame was sharper but not enough to cause any trouble.

Laboratory test showed that we could go to 730 Btu. and not encounter too much trouble. At 730 Btu. the gravity of the mixture was .52 as against .64 for natural gas, which accounts for our being able to cut the gas to such a low Btu. value. Incidentally best results were obtained with an 870 Btu. mixture.

When it became evident that the 54 C. K. ovens might not be completed in time, we decided that we would experiment with a mixture of propane and blast furnace gas to underfire our ovens. A mixture of 82% blast furnace gas (having a heating value of 90 Btu.) and 18% propane gas gave us a gas which served our purpose, although the gravity of the gas changed from .42 to approximately 1.10 when underfiring with the propane-blast gas mixture. We had calculated that the mixture would lengthen our flame considerably and, that with everything else being equal, we would get a better flue heat in our Semet-Solvay and Wilputte ovens than we did with coke oven gas. We also figured that the pressures in the manifold would have to be raised considerably. This proved to be correct. However, other complications and problems, (which were later solved),

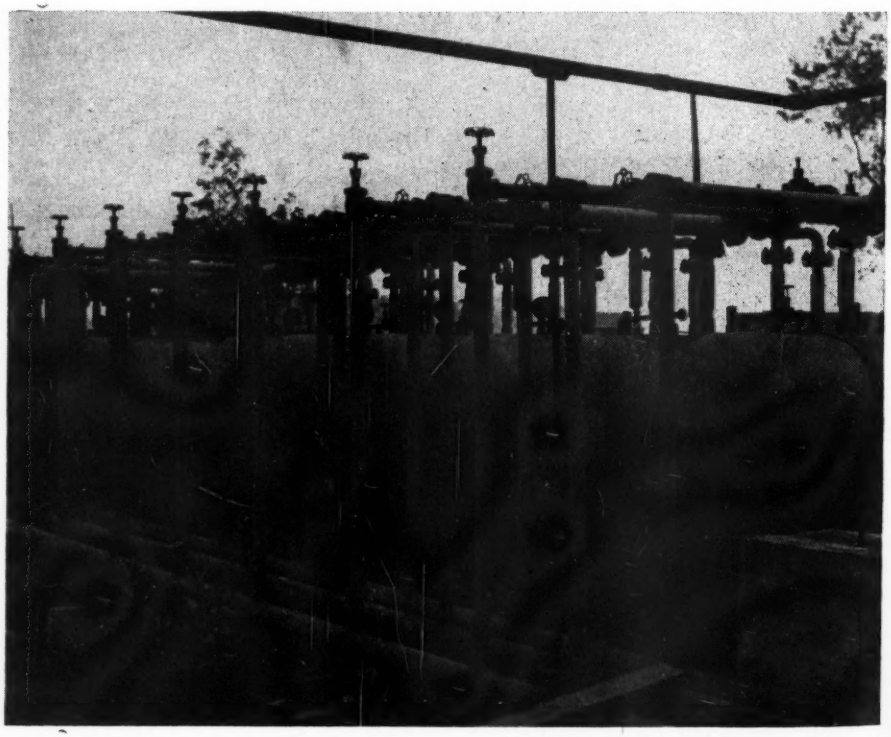


FIG. 2. End view of storage tanks showing valves for loading and unloading.

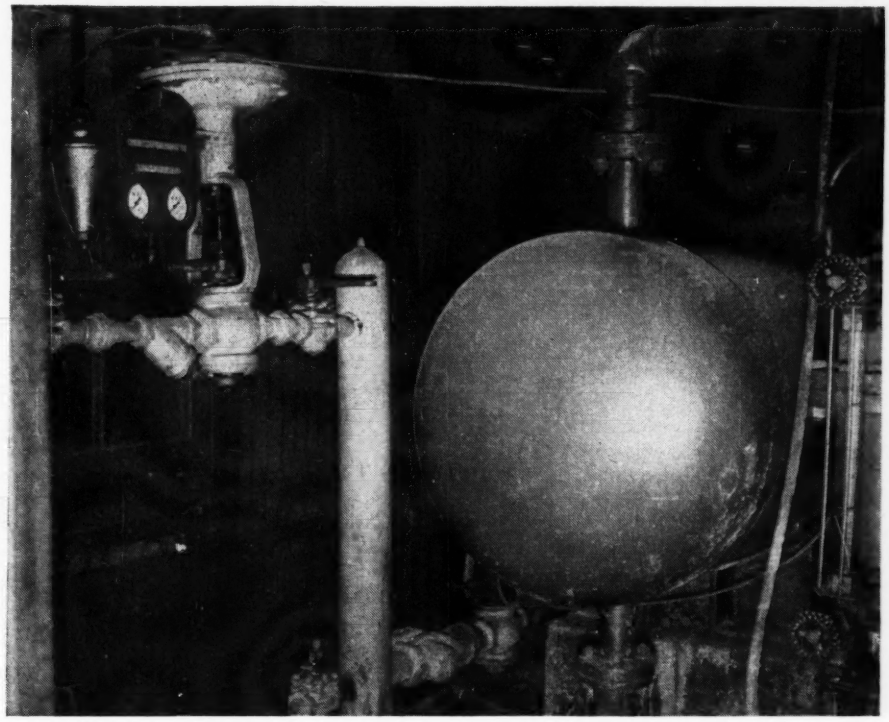


FIG. 3. Propane vaporizer building interior.

entered the picture especially when underfiring the Willputte ovens, requiring a reversal of gas. On the Semet-Solvay block where the air only is reversed, the problem was simple.

For the underfiring of the ovens, we installed automatic mixing equipment which allowed us to mix blast furnace and propane gas to a Btu., approximating coke oven gas, the Btu. of the mix being automatically sustained.

The natural gas in the intermediate feeder system was distributed at a pressure of approximately 10 lbs. Since the natural gas companies had decided that at all times during the winter they could give us some gas, we decided to put in control equipment which worked as follows: The propane and the coke oven gas were automatically mixed and held to a Btu. of approximately 1030. This separate source of mixed gas was connected to the natural gas system so that when pressure in the natural gas system dropped below 10 lbs., the propane mixing system automatically came into operation and fed into the natural gas system, maintaining the pressure at 10 lbs. It was an ingenious device designed by the Cutler-Hammer Co. but it has never been necessary for us to use it because, as mentioned before, there have been periods from four to five months when no natural gas was available and with these smaller quantities of natural gas we could operate the propane mixing system by hand. The propane system, as a whole, was designed by Hanlan-Waters and they did an excellent job.

The versatility of propane may be shown by the following conditions, all necessitated by: (1) extremes in weather; (2) propane stores low; (3) inherent plant mechanical troubles; (4) freeze-ups in propane lines, and so forth.

1. Changed from 100% natural gas to 100% propane—coke oven gas and various proportions intermediate, all in one day.
2. Send out of the propane—coke oven mixture changed from 1200 Btu. down to 730 Btu. in one day.
3. Underfired coke ovens with 100% propane—blast furnace gas mixture, then changed to 100% coke oven gas; to 80% carbureted water gas and 20% coke oven gas; to 40% coke oven gas and 60% carburetted water gas, all in one day.
4. Pulled heavily on the ovens, lowering the Btu. of the coke oven gas, added blast furnace gas, and then carburetting the increased quantity of lean gas up to 530 Btu. with propane.

There is no doubt that propane is a cure-all for many troubles in a natural gas system. It is also an extremely useful tool in a manufactured gas system. There is no doubt that if the price of propane is within reach, it is by far the most versatile stand-by yet devised.

It may interest our readers to know that at times, due to the shortage of propane, our storage is filled with butane. Results with butane differed very little from those with propane. This, of course, is obvious when one realizes that butane is heavier than propane and that because of its higher Btu. value less butane and more of the light gas is needed. This makes the resulting mixture almost the same in both cases. Moreover, due to the small proportion of butane and propane in the mix, the partial pressure of butane or propane is such that we could go to extremely low temperatures and comparatively high pressures before getting in to any condensation troubles.

In conclusion it might be interesting to note that during the season 1942-43 we used approximately 2,100,000 U. S. gals. of propane and butane; during the season 1943-44 our needs were approximately 1,600,000 U. S. gals. of propane. On several extremely cold days, due to the necessity of underfiring our coke ovens in addition to supplying our natural gas district, we have used as high as 60,000 U. S. gals. of propane in one day. We have fired the Solvay battery for 90 straight days on 550 Btu. gas; we have also fired the Wilputte battery for 18 straight days and intermittently for 90 days with a 450 Btu. gas.

Liquefied Petroleum Gas as a Standby Fuel

K. B. ANDERSON, Coast Counties Gas and Electric Co., Santa Cruz., Calif. From a paper, "Experience with Butane Standby Plant," presented before the conference on Production and Measurement, Technical Section, Pacific Coast Gas Association, Fresno, Calif., February 16 and 17, 1944.

IN 1936 a study of the conditions of natural gas supply to the City of Santa Cruz, Calif., led to recommendation of standby plant installation. One of the factors leading up to this recommendation was 40 miles of high pressure transmission line traversing earthquake faults, rivers, and potential slide areas.

A paper by A. R. Bailey, written in 1938, describes the installation. Briefly this consisted of one 25,000-gallon liquid butane storage vessel, two direct fired vaporizers and two gas air inspirators, the vaporizer-inspirator units each being capable of making 42 Mcf per hour of 1670 Btu

FIG. 3. General view of Santa Cruz Gas-Air plant, showing vaporizers with inspirators and controls.

gas into a 300 Mcf low pressure water sealed holder, from which the gas could be compressed into the distribution system by means of a 140 Mcf. per hour two -unit electric driven compressor installation. Since installation, the plant has been subject to almost continual revision in order to meet GO-94 safety provisions, overcome operating difficulties, and simplify the operation to avoid confussion in emergencies.

In 1943 a further study was made in the light of changed conditions, such as:

1. Increased demand due to growth of the system.
2. Provision for standby supply to the City of Watsonville.
3. Increased hazards due to wartime conditions.
4. WPB restrictions in the use of material for plant expansion and other security measures.

The re-arrangement of the standby plant as a result of this study will be described briefly:

Calculations and tests indicated that Gas Air inspirators are capable of making 1650 Btu. butane-air gas against 5 lb. back pressure. It was, therefore, feasible to arrange the plant to make directly into the Santa Cruz 5 lb. distribution system, thus making the plant independent of electric power and also making the compressor capacity available for boosting gas from the low pressure holder through the 20-mile transmission line to Watsonville.

The vaporizer unit was re-arranged to provide greater and more efficient heat input. As the vapor re-heater sections of the vaporizers were found to be ineffective, they were removed and combined to form a third vaporizer unit. The plant is now arranged so that the three vaporizer units feed into a common header from whence the vapor for the inspirators is distributed. The combined capacity of the plant is 120 Mcf. per hour of 1650 Btu. gas or a Btu. output equivalent to 180 Mcf. of 1100 Btu. natural gas. Because of the flow characteristics of the heavier gas, the total heat input of utilization appliances is reduced approximately 5% so that the 180 Mcf. natural gas equivalent output is capable of serving a normal 190 Mcf. demand.

The re-designed plant is so simple in operation that it can be placed in full production in 15 minutes from a cold start. It was decided that 1650 Btu. was the proper mixture for the substitute fuel, using flame characteristics as the criterion.

When the plant is in operation, heating value is checked continuously by means of a Connelly Iron Sponge "Caloroptic" which is checked periodically with a Junkers calorimeter. In addition, a test rack of range, water heater and refrigerator burners is kept in operation and piping arranged to be switched from the plant sample line to natural gas periodically to check comparison of the flame characteristics on the two gases.

The plant is entirely manually operated. The plant output is 0, 60 or 120 Mcf. per hour, intermediate regulation being obtained by a back pressure regulator set at 5 lbs. which feeds excess production into the low pressure holder. The holder can be lowered when necessary by means of the compressors.

Normal operating crew consists of two men, one to watch the butane apparatus while the other attends the compressors and operates the calorimeter, although in an emergency the entire plant can be operated by one man. Complete operating instructions with charts and diagrams are posted in a conspicuous location at the plant.

Test runs are made at regular intervals to check condition of the apparatus and to keep personnel, charged with emergency operation, familiar with the procedure.

Utility Operation of Isolated Butane Systems

K. B. ANDERSON, Coast Counties Gas and Electric Co., Santa Cruz, Calif. **From a paper, "Experience with Isolated Butane Systems," presented before the Conference on Production and Measurement, Technical Section, Pacific Coast Gas Association, Fresno, Calif., February 16 and 17, 1944.**

OUR company has had in operation for 13 years six isolated butane-air systems distributed geographically from the Oregon line to the Mexican border. These systems vary in size from 250 to 1300 customers and in operating conditions from 4000 ft. above sea level to 150 ft. below, and from 0 to 130° in temperature.

The distribution systems are conventional, high pressure steel mains with individual regulators at each meter. The plant plans were originally designed for 550 Btu. butane-air gas, using intermittent cycle compressors boosting the mixture, combined at atmospheric pressure, into high pressure holders operating automatically between 15 and 30 lbs. per sq. in.

The plants were originally designed to take vapor from the top of liquid butane storage tanks, using heat absorbed from the atmosphere for vaporization, and reducing the vapor to atmospheric pressure through a series of regulators to a butterfly valve controlled electrically from a Cutler Hammer "Calorimixer" unit. The air was drawn from outside the building through a filter and mixed with the butane in a special tee at the intake of the compressor. The compressor units varied in size from a 25 hp. sin-

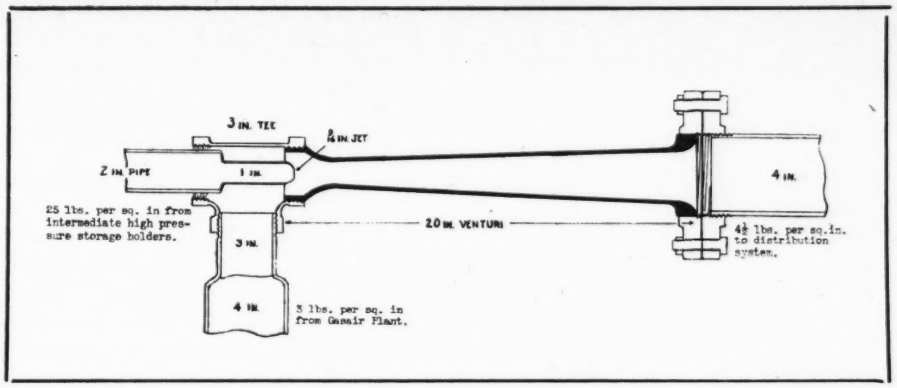

3 IN. TEE
¾ IN. JET
2 IN. PIPE
1 IN.
4 IN.
25 lbs. per sq. in from intermediate high pressure storage holders.
3 IN.
20 IN. VENTURI
4½ lbs. per sq.in. to distribution system.
4 IN.
3 lbs. per sq. in from Gasair Plant.

FIG. 1. Venturi booster.

gle unit in the smaller towns to two units of 75 hp. each installation in the largest town.

Pioneers in the field, it is not surprising that several "bugs" developed in the early stages of operation. The first had to do with the complexity of the automatic heating value control apparatus. It was found practical to eliminate this control entirely, operating with a fixed position of the butterfly valve, adjusting the position manually from time to time as indicated by the Connely Iron Sponge Co. "caloroptic." The butterfly valves were later replaced by Hancock "V" port valves which gave somewhat better results due to elimination of lost motion and more accurate recording of position.

Vaporization Difficulty

The second difficulty had to do with the vaporization of the butane at extremely cold ambient temperatures. This was corrected by the installation of liquid vaporizers, whereby the liquid was vaporized, during the winter season, in a separate unit surrounded by hot water from a General "big four" booster water heater.

The third difficulty arose from the dependence upon electric power. Located, as some of the plants were, in isolated mountain regions, power outages of several hours were not infrequent. This difficulty was solved first by provision of a special pulley to be attached to the rear axle of a Ford "Model A" pickup located outside the building, when the compressor could be driven by a long flat rubber belt running through a port in the building wall.

Later a stationary engine (usually a "Model A") was located in a galvanized iron lean-to outside the compressor room and arranged so that in an emergency a rubber belt could be thrown over the compressor fly wheel and operated under manual control until power service was resumed. As an improvement, in later standby equipment, a gas engine driven Roots-Connersville blower was designed to make gas directly into the distribution system. This had the advantage of by-passing the entire plant, thus permitting maintenance and repair of all units and vessels.

Because of utilization difficulties inherent in the 550 Btu. gas (Bureau of Mines investigation indicated 550 too lean even for primary mix in burners), because of imminent capacity deficiencies in some of the plants, and because of certain operating and power savings, it was decided in 1940 to convert all butane towns to 1000 Btu. gas.

At this time experiments were carried on with various means of making gas directly into the system with the aim of reducing power costs. Among these was the installation of one 5 Mcf. per hour "gas-air" machine utilizing a direct fired vaporizer and the natural vapor pressure of the butane (augmented by introduction of made gas above the liquid during low temperature periods) as a source of energy to entrain air through a venturi tube against 3 lb. pressure carried in the distribution system. Although many minor difficulties were experienced in the operation of this apparatus, attractive savings were shown possible and, further, the elimination of dependence upon electric power promised relief from the most common source of emergency operation.

Early in 1942 wartime expansion caused a serious shortage of production capacity in a neighboring utility. Surveys revealed that the needed capacity could be gained with the minimum use of critical materials by the conversion of our plants to the gas-air system and the release of our high pressure holders, compressors and electric motors to the neighboring utility. By August our company was launched into a "Henry Kaiser" type of expedited performance by which at the end of December, 1942, the following had been accomplished:

1. All six towns had been equipped with gas-air apparatus making directly into the distribution systems.

2. High pressure holders, compressors, electric motors and allied apparatus had been stripped from the plants and shipped to the neighboring utility.

3. By converting one high pressure holder to a butane-liquid vessel, juggling liquid vessels from town to town, and installing one second-hand liquid butane vessel, the liquid butane storage facilities in three of our most isolated towns was doubled, making it possible to take care of increased use and provide security against the uncertainty of butane availability and transportation schedules.

After one full year's operation, our experience can be summarized as follows:

1. The piping, wiring and general arrangements of each plant have been greatly simplified.

2. The operating cost has been reduced by the almost entire elimination of electric power. This saving is reduced somewhat by the use of fuel for vaporization (approximately 1% of the plant output).

3. Maintenance cost has increased due to the necessity of frequent replacement of minor parts. This gives promise of reduction as improvements are made in the apparatus.

4. Somewhat less uniformity in the heating value of the gas produced, punctuated by occasional production of very rich gas causing an epidemic of complaints and necessitating purging of the mains. On the whole, the tendency of this apparatus to make rich gas is perhaps safer than the tendency of the former system to make lean gas.

5. About equal, although not directly comparable, security against total outage. By way of explanation, each plant is now equipped with at least two units and so sized that the peak loads can be carried with one machine always available as standby, heated up and ready to cut in automatically upon failure of one of the operating units. As dependability increases by continual minor improvements in the apparatus, this security should soon become entirely satisfactory. With the former plant, high pressure storage capable of carrying a peak-load from 15 minutes to several hours provided the time interval necessary for an operator to reach the plant and place the standby equipment in operation. If the operator could not be reached in time, however, the former plant lacked the security of automatic continuous standby operation. With the new plant, in the event of failure of the standby, or more than one unit of the operating equipment, the lack of storage would preclude the possibility of the operator reaching the plant in time to start standby equipment. Therefore, the conclusion that the two systems are essentially equal in security against outage. The new system, however, offers more promise of ultimate improvement.

6. The gas-air equipment has a definite pressure limitation, 3 lbs. per sq. in. being the maximum output pressure that can be depended upon, making 1000 Btu. butane-air gas at sea level.

This pressure limitation provided an interesting problem in our largest

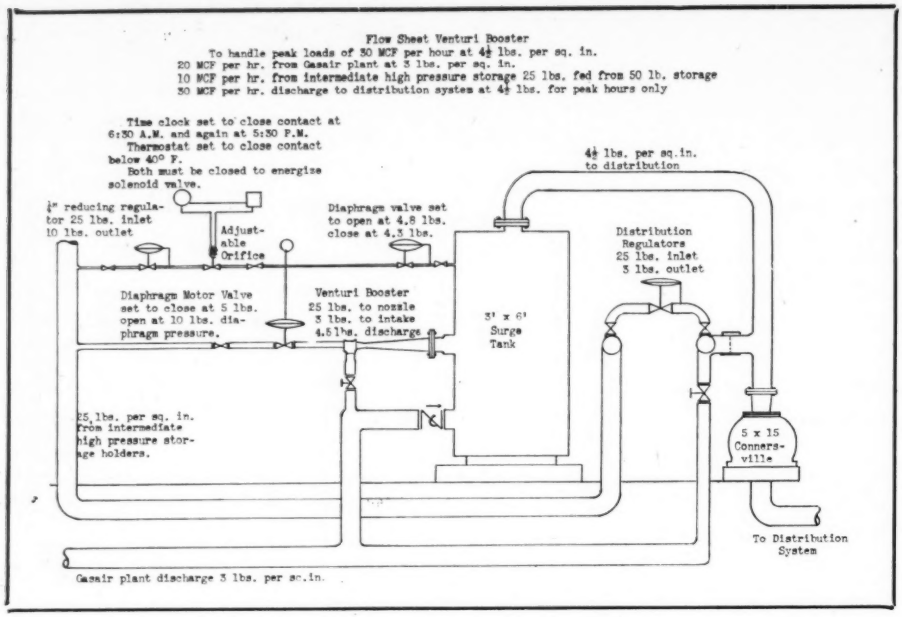

Flow Sheet Venturi Booster
To handle peak loads of 30 MCF per hour at 4½ lbs. per sq. in.
20 MCF per hr. from Gasair plant at 3 lbs. per sq. in.
10 MCF per hr. from intermediate high pressure storage 25 lbs. fed from 50 lb. storage
30 MCF per hr. discharge to distribution system at 4½ lbs. for peak hours only
Time clock set to close contact at 6:30 A.M. and again at 5:30 P.M.
Thermostat set to close contact below 40° F.
Both must be closed to energize solenoid valve.
4½ lbs. per sq.in. to distribution
¾" reducing regulator 25 lbs. inlet 10 lbs. outlet
Adjustable Orifice
Diaphragm valve set to open at 4.8 lbs. close at 4.3 lbs.
Distribution Regulators 25 lbs. inlet 5 lbs. outlet
Diaphragm Motor Valve set to close at 5 lbs. open at 10 lbs. diaphragm pressure.
Venturi Booster 25 lbs. to nozzle 3 lbs. to intake 4.5 lbs. discharge
3' x 6' Surge Tank
25 lbs. per sq. in. from intermediate high pressure storage holders.
5 x 15 Connersville
To Distribution System
Gasair plant discharge 3 lbs. per sq.in.

FIG. 2. Flow sheet of venturi booster.

town. Due to growth of load and restriction on plant expenditures under WPB, 3 lbs. per sq. in. is insufficient to handle peak hour loads. Although this particular plant still has high pressure "made gas" storage, the capacity of the holders carrying the entire peak load would be less than one hour and the capacity of the electric driven high pressure compressor is only one-fourth of the peak load.

There is also a butane engine driven Roots-Connersville standby installation in this plant which is capable of carrying the entire load, either making gas direct from butane vapor and air through a Kemp mixer, or as a booster from the gas-air plant into the system. In either case, however, constant attention of an operator is required during operation.

Inspirator Booster

In order to make the best use of the facilities available, it was decided to try the principle used in the gas-air machine itself, namely, an inspirator type booster utilizing the energy in the high pressure gas to boost the 3 lb. gas to 4½ lbs. A 4 in. McKee high pressure inspirator burner with a 1½ in. throat diameter was used as the inspirator. The 3 lb. gas from the gas-air plant was introduced into the air mixer by means of a 3 in. malleable iron tee and 25 lb. gas regulated from high pressure storage, through a conventional 5/8 in. diameter spud. A check valve was introduced into the system in such a way that the high pressure gas could be turned on automatically by a time clock at 6:30 a.m. in order to pack the distribution system before the morning peak.

It was found that 20,000 cu. ft. per hour of 3 lb. gas could be boosted to approximately 4½ lbs. by the use of 10,000 ft. of 25 lb. gas, thus resulting in production of the desired sendout of 30,000 ft. per hour at 4½ lb. pressure. The high pressure holder by this means is able to carry the load easily until the operator comes on duty at 8:00, whereupon the engine operated booster is put into operation and the high pressure holders refilled for use again during the afternoon peak.

Fig. 1 shows this "venturi booster," and Fig. 2 the general plant arrangement.

This apparatus, while inefficient, is so simple in operation that it is thought to have possibility for the utilization of existing low pressure storage on high pressure systems.

All plants maintain standard inventories of spare parts and are provided with complete operating instructions and diagrams. Tool boards upon which are mounted the necessary tools for maintenance and operation, and periodic inspection and preventive maintenance procedure, insure continuity of performance.

Alarm systems over leased wires to office and home of operators warn of:

1. High or low pressure in butane storage.
2. High or low pressure in "made gas" (the principal cause of Btu. variation).
3. Pilot outage in vaporizers.
4. Power outage.
5. Low main pressure at extremity of distribution system.

One additional alarm is needed to warn of "rich gas." Suitable detection apparatus is not available at the present time.

The entire operating, maintenance, commercial, and sales functions are performed in most of the towns by one man, so it is obvious that it is necessary for the production apparatus to function smoothly.

Bills to Amend Wisconsin Gas Laws Introduced

Two bills have been introduced to repeal and amend legislation passed in 1943 to keep natural gas out of Wisconsin (see March GAS, pp. 7 and 8). Bill No. 209-A repeals the present law which placed an excise tax of 7¢ on each Mcf. or fraction thereof. Bill No. 208-A amends the existing statute so that a single community would not have the power to veto the introduction of natural gas if the Public Service Commission finds such introduction in the public interest.

The Milwaukee Gas Light Co. and the Madison Gas & Electric Co. have published newspaper advertisements setting forth the benefits to be derived by the people through the introduction of natural gas and urging people to appeal to their legislative representatives to vote for the passage of bills No. 208-A and 209-A.

Bruno Rahn, president of the Milwaukee Gas Light Co., at a dinner for Milwaukee county's state senators and assemblymen, explained in detail the benefits which residence and industrial customers would experience.

Companies Agree on Piping Texas Gas to Canada

Panhandle Eastern Pipe Line Co. has reached an agreement with the Union Gas Co. of Canada, Ltd., to supply gas from Texas to southwestern Ontario, if the United States authorities approve the transaction.

According to the agreement, approximately 5,000,000,000 cu. ft. of gas per year will be delivered in varying quantities throughout the off-peak period, from April to November.

The construction of some 70 miles of transmission lines, including a line under the Detroit river connecting the Union lines with the terminus of Panhandle's line, will be necessary. Compressor plants in Canada will be built. The project will involve expenditures by the Union company of about $3,000,000.

The date when the supply will be available depends on the time required to obtain the necessary export authority from the United States government, and to fix a satisfactory price to be paid by the Canadian company's consumers.

FPC Hearing Postponed

The FPC has postponed to April 12 the hearing previously set for March 7 in Chicago on Central Illinois Public Service Co.'s petition for an order directing Panhandle Eastern Pipe Line Co. to extend its pipeline to connect with the former company's distribution system and serve it with sufficient gas to meet its requirements in four eastern Illinois communities.

DOMESTIC GAS RESEARCH

Abstracts of Papers Prepared for Presentation Before 1945's Cancelled Conventions

H. LUOMA, chief engineer, Domestic Gas Research. Abstract of "New Data on Design and Sizing of Automatic Gas Storage Water Heaters for Maximum Service Efficiency."

PRINCIPLES involved in sizing of automatic storage gas water heaters for maximum service efficiency are discussed in light of new experimental findings. Results of additional tests to determine effectiveness of flue gas and hot water heat traps are presented, confirming previous findings that such devices are ineffective from a practical standpoint. Methods for improvement of service efficiency of instantaneous type heaters are set forth. Possibilities for increasing service efficiency by means of two-stage heating, and power burners ignited by an electric spark, are indicated; the former appears to have doubtful value, but the latter showed some promise.

LEON OURUSOFF, member, Technical Advisory Subcommittee for Project No. 1, Domestic Gas Cooking Research, and R. C. GREGG, assistant chief research engineer. Abstract of a paper, "Review of Research in Kitchen Ventilation."

ATTENTION is being given to the important feature of kitchen ventilation. The need for advancement in that technique has been intensified by the necessity of keeping abreast with modern concepts of kitchen design requiring something better than the use of unsightly canopy hoods or conventional ventilating fans installed in the wall.

Studies to date have entailed removal of excess heat, moisture and cooking odors resulting from operation of the domestic gas range.

Test assemblies were made to represent a hood built in to a standard kitchen cabinet, a wall type hood, and a full canopy type hood. All three types of hoods were connected to a cage type blower capable of exhausting air at any desired rate up to 900 cfm. The height of the hoods above the range was also varied.

It appears that the effectiveness of ventilating a kitchen from the standpoints of removal of excess heat, moisture and cooking odors is highly dependent upon the rate of air withdrawal. Results of tests indicate that, based on the assumption that 300 cfm is the maximum practical rate of air withdrawal, a cabinet type ventilating hood offers good possibilities from the overall standpoints of appearance, performance and simplicity of design and installation. Removal of moisture is comparatively easy since practically all moisture produced by rear top burners and oven can be removed with any of the three types of hoods studied. With the cabinet type hood removal of approximately 70 to 80% of the moisture produced by the front top burners can be effected.

Although all odors cannot be removed from the kitchen even with very high rates of air withdrawal, proper ventilation aids materially in confining odors to the kitchen.

K. R. KNAPP, chief engineer. Abstract of a paper "Performance Characteristics of Vented Domestic Gas Ranges."

RESEARCH studies show that normal variations in chimney drafts do not adversely affect performance of properly vented domestic gas ranges not installed flush-to-wall. They also indicate that contemporary draft relief devices permit satisfactory oven and broiler performance of flush-to-wall types but are inadequate to do so in the case of cooking top sections.

Two general methods of venting which will insure good performance of all sections are presented. An application of one of these methods is discussed and advantages offered by its use outlined.

THE SERIES OF technical papers treated herewith, written by members of the A.G.A. Testing Laboratories, were originally intended for presentation at the A.G.A. Technical Conference on Domestic Gas Research, scheduled for Cleveland in February 1945 and Los Angeles in March 1945, which conferences were cancelled in compliance with the recent ODT request.

These papers to some extent review data discussed at similar conferences held early in 1944 and A.G.A. Laboratory Research Bulletins recently published, but for the most part present new information obtained since the 1944 conference.

The full text of all of these papers can be obtained from the A.G.A. Testing Laboratories, 10700 Euclid Ave., Cleveland 6, Ohio.

R. M. CONNER, director. Abstract of a paper, "Methods of Reducing Gas Range Surface Temperatures."

THE desirability of low surface temperatures for gas appliances is discussed. In the case of ranges the greatest accomplishments in this direction can be brought about by (1) proper insulation (2) elimination of flue gas leakage through doors (3) reduction of metal to metal contacts. Practical suggestions are presented on ways and means of accomplishing these three objectives. In the main, theories advanced are equally applicable to other types of domestic gas burning equipment.

F. R. WRIGHT, manager, Testing and Inspection Department. Abstract of a paper, "A Mathematical Approach to the Design of Atmospheric Gas Burners for Maximum Primary Air Injection."

PERHAPS the most important item in gas burner design (Bunsen type) is insurance of an adequate supply of primary air. Methods of determining this factor are set forth and its relationship to other significant variables analyzed. While it is not yet possible to determine every variable which affects performance of gas burners mathematically, substantial progress has been made. A satisfactory formula for determination of per cent primary air injection under any given set of conditions is developed and presented.

F. E. VANDAVEER, supervisor. Abstract of a paper, "Design of Atmospheric Gas Range Top Sections for Optimum Performance Characteristics."

RELATIONSHIPS between gas input rates, both adjustment and turn-down and heating speed, thermal efficiency, and heat distribution for contemporary top section design are presented. Variations in utensil diameter and material on thermal efficiency and heating speed are considered. Results pointing to proper sizing and location of opening in aeration pan around each burner are given. Data on optimum distance between top burner ports and top of grate as it effects combustion and efficiency are discussed.

Grate design factors such as venting height, free area through grates and prong area are evaluated in terms of efficiency. Interesting information

which can be used for improving efficiency by increasing heat transfer through sides of utensils and for minimizing tipping of utensils on grates by appropriate grate design is also set forth.

H. LUOMA, chief engineer, Domestic Gas Research. Abstract of a paper, "Burner Head Temperature as a Factor in the Design of Aerated Gas Burners."

A non-mathematical discussion of the effect of elevated air-gas mixture temperatures within a gas burner head on heights of flame inner cone and outer mantle is presented. Such characteristic flame limits as lifting, yellow tip, and flash-back are quantitatively analyzed as functions of the burner head air-gas temperature with emphasis on the significance of the latter in practical problems of burner design.

Probably one of the most undesirable characteristics that must be dealt with in the design of gas burners is the tendency for the flames in certain applications to flash back and burn at the orifice.

Aside from the type of fuel, tendency to flash back is dependent upon the gas input rate, port size, port depth, port spacing, primary air, and temperature of the burner ports and air-gas mixture. The effect of the latter is particularly appreciable as compared to the effect on other flame characteristics (lifting and yellow tipping) and for that reason merits serious consideration in application of burners for manufactured gas utilization.

H. LUOMA, chief engineer, Domestic Gas Research. Abstract of a paper, "New Data on Burners Injecting All Air Required for Combustion."

FUNDAMENTAL problems in the design of burners utilizing all air for combustion as primary air are briefly reviewed. Data obtained with experimental burners of various port design atmospherically injecting air in excess of 100% are discussed from the standpoint of maximum input rates obtainable with available gas pressures and elevated burner head air-gas temperatures.

Flash-back tendencies in totally aerated burners using manufactured gas and at turn-down rates as low as one-fifth of the normal gas input rate are also analyzed and expedients for their correction discussed.

The data presented bring out the difficulties that at present prevent accomplishing the design of a satisfactory 100% primary air burner for use with manufactured gas. Fortunately, the major obstacle of flash-back is encountered to a considerably less extent with natural gas and satisfactory burners utilizing this gas have been built. As indicated above a totally aerated burner of special design can be made to operate satisfactorily on manufactured gas by employing certain expedients. However, judging from studies thus far made, development of a simple burner for overall satisfactory performance does not look promising.

F. E. VANDAVEER, supervisor. Abstract of a paper, "Ability of Primary Air Control Devices to Regulate Injection and to Resist Closure Due to Dust, Lint, and Grease."

OPERATING characteristics of most known devices for regulating primary air injection for atmospheric burners including air shutters, countersunk orifices, double orifices, extended orifices, angle orifices, pressure reduction orifices, and various combinations of them are presented. They are evaluated in terms of range of primary air control, noise in operation, susceptibility to closure by dirt etc., back pressure at mixer, and probable field performance.

When all practical and theoretical factors are considered it is believed that an adjustable primary air shutter providing approximately circular openings down to nearly the point of closure and which does not permit air leakage between the shutter and mixer face or between shutter and orifice fitting is most satisfactory on appliances designed for general national distribution. When tight fitting air shutters are not commercially practical, or in locations of excessive dust and lint, or for use with gases combining high specific gravity and low heating value, supplied at reasonably high distribution pressure, properly selected primary air control devices should provide satisfactory service.

K. H. FLINT, chief engineer, Industrial Gas Research. Abstract of a paper, "Design of Large Atmospheric Gas Burners for Minimum Noise of Extinction."

ONE of the more objectionable characteristics of large burners is the noise that may accompany flame extinction when the gas supply is suddenly shut off. When burners are enclosed in furnaces with ducts leading to each room which may act as sounding boards to convey noise it becomes very necessary to furnish burners that will be silent in their operation and extinguishment, if customer satisfaction is to be maintained. While this type of noise is more prevalent on fast burning gases, it may exist with slower burning types such as natural and liquefied petroleum gases.

Relationships between factors of burner design and gas flow and percentage of primary air at noise of extinction limits of large burners are presented. A formula which departs radically from the previously determined relationship for smaller type atmospheric burners is developed to represent the new relationship. It includes as governing factors, gas pressure, diameter of mixing tube, and gas input rate per port.

Definite fields of application are described for the two criteria of noise of extinction so that the limits in terms of per cent primary air of any size of atmospheric burner for domestic use may be predicted. Suggested means of modifying conventional mixing tube design to minimize propensity of burners to extinguish with noise are given.

K. H. FLINT, chief engineer, Industrial Gas Research. Abstract of a paper, "Automatic Ignition of Domestic Gas Appliances."

FUNDAMENTAL principles underlying automatic ignition of gases by means of flash tubes and hot wire coil igniters are presented.

Relationship between various flash tube design factors are reviewed. Suggested design elements evaluated from experimental data that afford a basis for satisfactory design of ignition systems are shown. Factors of coil design are analyzed including composition and size of wire, surface area, coil spacing and coil diameter. Longevity of various types of coil igniters under varied operating conditions is discussed.

It is concluded that it should be possible to design a flash tube that will operate satisfactorily on any city gas with a specific gravity less than unity. For universal use the pilot rate should be controllable, as there is the possibility of the input falling below the low gas rate limit for one gas when adjusted on a gas of slightly different gravity or composition. However, satisfactory performance of the natural gas flash tube on a number of types of natural gas as well as manufactured has indicated that good results can be obtained no matter what gas is used.

It is also concluded that electric coil igniters possess characteristics which render them useful for ignition of fuel gas mixtures provided proper selection of the type of igniter is made with due regard to the conditions that will be encountered in service. The use of the right type of metal, correct placement in the appliance and control of the power input to assure ignition but not overheating should assure a workable igniter with a reasonable life expectancy.

Corrosion of Equipment in High Pressure Gas Wells

MANY billions of cu. ft. of natural gas have been produced in this country in the past and no signs of serious corrosion of the equipment through which this gas was produced have been observed when the gas was free of hydrogen sulphide.

Until recently it seemed reasonable to extrapolate past experiences with sweet natural gas into the future, and to assume that, when producing sweet natural gas, serious corrosion of equipment would not occur. Recent observations, however, have shown clearly that serious corrosion may occur when sweet natural gas is produced under high pressures.

The first reported observation of serious corrosion due to sweet natural gas was made in the Autumn of 1942. It was found necessary to replace a defective valve on a high pressure gas well in the Opelika, Texas Field, and in the course of replacing this valve it was found that the valve itself and other surface fittings on the wellhead had been seriously corroded.

In view of these obstructions, all other wells in this Opelika Field were immediately inspected. This inspection indicated that several wells in this same field had been similarly affected whereas other wells were entirely free of any sign of internal corrosion.

Wells in the Grapeland and the Willow Springs Fields, Texas, were operating under conditions almost identical with those in the Opelika Field and the wells in these other two fields were also inspected. These inspections failed to reveal any serious internal corrosion of the wells in the Willow Springs and Grapeland Fields.

Problem Becomes Apparent

On the basis of the above information, this corrosion problem appeared to be confined to six or eight wells and to have no general significance. However, a paper discussing this problem was presented before the Natural Gasoline Association of America Meeting of April, 1943, as it seemed desirable to publicize the problem so that other operators would be advised of its possible existence on their properties. There was no public indication of any other occurence of this particular type of corrosion at this April, 1943, Meeting.

However, several operators of similar properties subsequently indicated interest in this problem and a meeting was held in Dallas in December, 1943, to discuss the problem further. It was clearly indicated at this meeting that this type of corrosion had been observed in numerous high pressure gas fields and that this problem was of sufficient magnitude to warrant serious attention.

The American Petroleum Institute had assigned the study of this problem to its Southwestern District Topical Committee on Materials, and in March, 1944, this committee appointed a subcommittee to study this problem of High Pressure Gas Corrosion. The Natural Gasoline Association of America also in March, 1944, appointed a sub-committee to study this problem further.

Since it appeared that this problem might affect every operator of a high pressure well, a cooperative program of research on this problem has been instituted under the sponsorship of the N.G.A.A. The N.G.A.A. has raised funds by direct subscription from interested operators for the prosecution of this research program and has retained The Battelle Memorial Institute of Columbus, Ohio, to actively prosecute this work at present. In addition to this Cooperative Research Program, many individual companies are conducting research work of their own on this problem.

THOMAS S. BACON, research engineer, Lone Star Producing Co., Dallas, Texas. Excerpts from a study, "Corrosion of Equipment in High Pressure Gas Wells." (Abstract by G A S).

The committees mentioned above are attempting to correlate all of this work and its results. Work of this kind is necessarily slow and it is reasonable to assume that concrete results will not be obtained for several years even though the research is being conducted with all possible dispatch.

The research program at The Battelle Memorial Institute involves, first, an attempt to determinate the cause or causes of this corrosion and, second, means of eliminating this corrosion. Suggested ways of elimination are:

1. Chemical treatment of, or addition of an inhibiter to, the produced fluids.
2. Use of protective films on the production equipment.
3. Corrosion resisting alloys for fabricating producing equipment.

As it appears that progress on determining the most desirable remedial methods will be assisted by knowledge of the cause of this corrosion, the initial point of attack of the cooperative research program is an attempt to determine these causes.

A New Problem

It will be realized from the above discussion that this problem of high pressure corrosion is a very new problem and that there is much to be learned about this problem before it can be satisfactorily solved. For the present, careful examination of all high pressure wells should be made at frequent intervals. The results of all such examinations, including all pertinent data regarding the individual wells and their operating conditions, should be reported to one or the other of the trade committees that have been organized to follow this work, and these results should be reported even if the well is found to be free of corrosion. Any suggestions regarding this problem and its solution should also be referred to one or both of these trade committees.

Portland Gas & Coke Co. Home Service Praised

Recognition of the outstanding contribution made by the home service department of the Portland (Ore.) Gas & Coke Co., to the wartime "Food Fights for Freedom" program, sponsored by the War Food Administration, was contained in a letter of appreciation from Keith Himebaugh, director of information, United States Department of Agriculture.

The war advertising council, Himebaugh stated, had recommended that the company be awarded a certificate of cooperation.

Montana Power Required By FPC to Make Adjustments

The FPC announced its opinion and order requiring the Montana Power Co. to make accounting adjustments in the amount of $51,978,025, the largest amount so far ordered disposed of by the commission in any accounting case.

The order requires the company to file entries by Jan. 31, 1946, disposing of write-ups and other improper charges to plant accounts in the amount of $46,891,597. This amount is 80% of the original cost ($58,023,509) of electric properties as of Jan. 1, 1937.

Billie Burke Show Cancelled

"The Billie Burke Show," radio program sponsored by Servel and broadcast every Saturday morning over the Columbia Broadcasting Company network for the past two years was cancelled as of March 24.

CORROSION AND PROTECTION

Of Buried Metallic Structures

Compiled and Abstracted by GUY CORFIELD, Technical Editor, GAS

6. Cathodic Protection, Application

The Viewpoint of Management

N. C. McGOWEN, president, United Gas Pipe Line Co., Shreveport, La. Excerpts from an address "Cathodic Protection and Corrosion From Management's Viewpoint" presented at the 15th annual convention Petroleum Industry Electrical Association and Petroleum Electric Supply Association, Shreveport.

MY first real introduction to cathodic protection was about 10 years ago. We had a section of pipeline 80 miles in length that was costing us approximately $500 a mile per year in excess maintenance costs. Our organization, in studying this problem, talked to me about cathodic protection, and while they explained in detail what they were talking about, I was not particularly concerned with the details; it was a little over my head. But when they talked of the cost, there immediately sprang into my mind the thought that if this thing that they called cathodic protection would work, it would accomplish the result of lowering our maintenance costs in what I consider to be one of the worst corrosive sections that has ever come to my attention.

When first discussing the work with those who were directly responsible for it, I was told that in order for it to be successful, the pipe must have a perfect enamel coating. This, of course, limited the work of cathodic protection to those lines that were enamel coated.

Cathodic protection work moved along slowly, and as we began to expand the work on other parts of our system we ran into difficulties that were not within our control, such as where our lines crossed or paralleled other companies' lines, the effect of our drainage attacked their lines. In order to solve this problem it was necessary that the lines that were attached be protected by cathodic protection, and if cooperation of the other companies could not be obtained, then we would have to cease our work in those areas or be subjected to damages.

So it has been interesting to me to view from the sidelines the refinement of cathodic protection. It was not a one-company proposition; it was an all-company proposition.

Now there is no longer needed a perfect enamel coated job—lines can be protected that have imperfect or no coating. After the initial scheme worked, then the job of pulling it to pieces, part by part, to perfect each and every part of cathodic protection, has had the attention of the engineers of the pipeline companies.

The work that has been done on ground beds has been a major study, and each and every detail has been pulled apart, and while today we have perfection when compared with the work that we were doing 10 years ago, in my opinion the opportunities for improvement and advancement today are just as great as they were 10 years ago.

Management feels a great source of pride in the accomplishments of corrosion engineers in the development of this pioneering effort in the battle against corrosion, and in this day, when the world is at war, what a great source of pride it must be to these engineers that they developed something in peacetime that is doing its part in this war effort.

Protection of the Bonita Pipeline

ROY O. DEAN, Oakland, Calif. Excerpts from a paper "Cathodic Protection of the Bonita Pipe Line" presented at the fifth National Bureau of Standards Soil Corrosion Conference, St. Louis.

THIS study describes the results obtained and the application of 10 cathodic protection stations to a 28 in. water main, 8¼ miles in length, which records show had over 1400 leaks due to soil corrosion before mitigative measures were applied.

The pipeline is the Bonita Steel Pipe Line of the City of San Diego, Calif., which was constructed in 1914 at an approximate cost of $220,000. It is a 28 in. diameter riveted steel pipe with a ¼ in. wall and originally was protected with an asphalt dip coating. The length of the line is 8¼ miles. This line connects to the 40 in. Otay Reservoir—San Diego main pipeline south of Bonita, and delivers water to the city distribution mains at 30th and Broadway. The pipeline has a capacity of about 8 million gals. of water per day, depending upon the demand and pressure. The water flow is by gravity and the internal pressure normally varies from 30 to 160 psi according to the hydraulic gradient. A maximum static pressure of 190 psi may be obtained at the lower elevation on this line during shutdowns.

This main has a number of distribution mains and service taps connected to it. The distribution mains vary in size from 2 in. to 12 in., the smaller sizes being bare screw connected wrought iron and the larger sizes cast iron with cemented joints. There are several steel gas distribution mains with service taps which are interlaced with the water system, and were found to be metallically and electrically connected to it through a number of domestic hot water heater connections.

Early Leakage History

Although there was no record of leaks kept from 1914 to 1932, there was an excessive number of leaks caused by soil corrosion during this period. These failures necessitated the excavating of nine sections, comprising 1674 lineal feet, for welding patches and sheaths around the pipe, and en-

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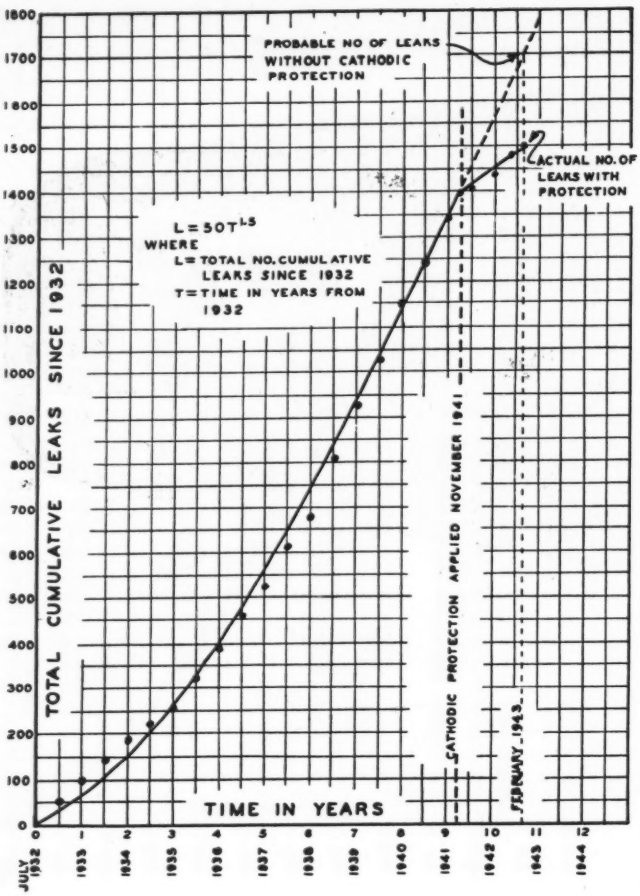

PROBABLE NO OF LEAKS WITHOUT CATHODIC PROTECTION
ACTUAL NO. OF LEAKS WITH PROTECTION
L = 50T^1.5
WHERE
L = TOTAL NO. CUMULATIVE LEAKS SINCE 1932
T = TIME IN YEARS FROM 1932
TOTAL CUMULATIVE LEAKS SINCE 1932
TIME IN YEARS
CATHODIC PROTECTION APPLIED NOVEMBER 1941
FEBRUARY 1943
JULY 1932

FIG. 1. Cumulative leak curve.

casing the pipe with gunite between the years of 1927 and 1932.

Referring to Table 1 it may be seen that there have been a total of 1500 pipe failures since July 1932 when a record of the leaks was started. These leak data are also shown graphically in Fig. 1. Dr. Gordon N. Scott, pipeline technologist of Los Angeles, was retained to make an electrolysis survey with specific recommendations for cathodic protection.

There have been failures along most of the entire length of this 8¼ mile water line, although more numerous in certain locales than others. Where leaks occurred, many deep pits were usually found nearby. The failures and the deepest pits in the majority of cases were found on the bottom section, but in some locations the sides or the top sections appeared to be more severely attacked by corrosion.

In 1940, a 350 ft. length of this pipeline was excavated, patches welded over corroded areas, and the pipe covered with asphalt. Again in 1940-1941, 12 more sections totaling 1803 ft. were excavated, encased with sheet steel, primed, enameled, and backfilled with sand to a point 6 in. above the pipe. The locations of reconditioned sections are shown in Fig. 2.

The first of the 10 rectifier stations was installed in July, 1941, under the supervision of the writer, then employed by the City of San Diego as cathodic protection engineer. The second rectifier was installed in November, 1941, and the other eight soon thereafter.

The locations of the rectifier stations were picked with relation to foreign structures, availability of right-of-ways, location of power, and the proximity to the areas of maximum corrosivity. The relative location along the pipeline of these stations may be seen on Fig. 2. The cost of each station complete, including right-of-way purchases, appears in Table 2.

The ground electrodes or anodes were made up from reclaimed 6 in. steel pipes installed horizontally and welded end to end and placed 300 ft. or as near 300 ft. as practical, from the pipeline. They were buried at a depth of from 5 to 6 ft. A ¾ in. capped riser pipe was installed at each end of the anode for watering when the soil resistance increased by drying. 4/0 stranded "Okosheath" cable was used for connecting the pipeline and anode to the rectifiers.

The d-c output rating, operating output, and operating efficiencies of the rectifiers are shown in Table 2. Station "A" is a copper-oxide unit manufactured by the Westinghouse Electric Co., while the other nine stations are of the Selenium type, as manufactured by the Electrical Facilities Inc.

Results of Electrolysis Tests

The high Corfield corrosivity factors and low resistance of the soil as shown on Fig. 2, indicates a highly corrosive soil. This corrosive quality of the soil is considered the predominating factor accounting for most of the corrosion on the pipeline.

Before the application of cathodic protection, small values of fluctuating railway currents were observed flowing on the pipeline. These currents predominated toward the south, with average values ranging from 0.4 to

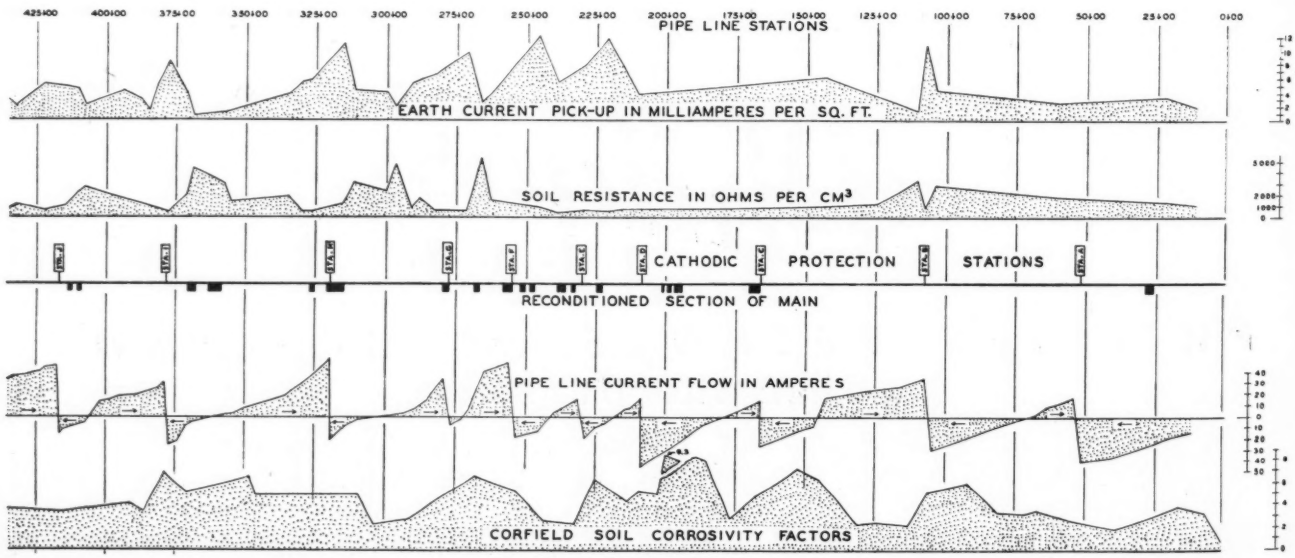

PIPE LINE STATIONS
EARTH CURRENT PICK-UP IN MILLIAMPERES PER SQ. FT.
SOIL RESISTANCE IN OHMS PER CM³
CATHODIC PROTECTION STATIONS
RECONDITIONED SECTION OF MAIN
PIPE LINE CURRENT FLOW IN AMPERES
CORFIELD SOIL CORROSIVITY FACTORS

FIG. 2. Electrolysis test data.

TABLE 1. NUMBER OF LEAKS PER MONTH

Year	January	February	March	April	May	June	July	August	September	October	November	December	Total per Year	Accumulated Total per Year
1932							10	13	16	9	5	5	58	58
1933	0	5	12	4	11	10	12	12	11	5	4	1	87	145
1934	4	1	8	11	6	12	2	12	7	7	6	3	79	24
1935	1	3	7	6	15	3	6	12	19	10	11	6	99	323
1936	8	14	7	6	18	15	17	14	20	8	7	5	139	462
1937	11	7	12	9	6	16	15	8	44	14	7	3	149	614
1938	9	2	8	7	30	9	31	25	21	27	20	7	196	810
1939	6	7	7	11	14	18	8	15	25	25	31	53	220	1030
1940	41	21	6	8	17	27	23	20	20	14	5	4	206	1236
1941	3	5	8	18	12	57	18	6	12	21				
	Cathodic Protection Applied in November, 1941										5	2	167	1403
1942	11	6	9	0	0	9	5	14	20	6	6	10	96	1499
1943	0	1												1500

TABLE 2. CATHODIC PROTECTION STATION COSTS: RECTIFIER RATINGS, OPERATING VALUES, AND EFFICIENCIES

Station	Rectifier Ratings		Rectifier Operating at		Operating Volt-Ampere Efficiency	Total Cost of Cathodic stations Installed Including Right-of-way Purchase
	Amperes	Volts	% of Full D.C. Current Rating	% of Full D.C. Voltage Rating	%	
A	75	16	74.7	82.0	61.2	$1513.38
B	100	16	75.0	83.7	58.2	1693.12
C	50	16	79.3	48.2	51.1	1390.88
D	100	8	65.5	80.0	65.5	1495.61
E*	50	8	70.0	86.3	58.7	1129.77
F	100	16	79.0	78.8	65.7	1726.75
G	100	8	56.0	86.3	59.3	1848.87
H	100	16	79.5	80.0	63.6	2028.62
I	100	16	72.0	84.0	67.5	1779.36
J	75	16	82.7	72.0	60.0	1622.96

*Station E was retired from service on this pipe line November 5, 1942. It was removed because of the urgent need for a rectifier at a very corrosive location on another pipe main unobtainable due to war priorities. This was possible because tests indicated the pipe in this vicinity to be receiving ample protection without this unit.

3.2 amperes, and overshadowing the presence, if any, of small galvanic current flow. Since the measurements of earth currents were found to be steady and indications of any fluctuating railway current noted at only a few locations, these fluctuating currents were not closely associated with the corrosion of this pipe. The earth current discharge ranged from a negligible value to a maximum of 0.9 milliamperes, while current pickup by the pipe ranged from a small value up to 1.15 milliamperes per sq. ft.

The resistance of the old asphalt dip coating was found to be extremely low, and ranged from 0 to about 1500 ohms per sq. ft. Inspections and observations confirmed these low readings. The coating appeared to be of slight value and was practically gone. Where it still remained, iron oxide was observed underneath, at most locations. Because of this poor coating condition the pipe was considered as bare in making earth current calculations.

The distribution of current flowing on the pipeline and the values of earth current pick-up with the 10 cathodic stations operating, are shown on drawing Fig. 2.

Numerous tests were made on the connecting water distribution mains and service taps and on the adjacently connected gas mains and services. These tests indicated the distribution mains and services of both utilities are receiving some protection, in varying degrees, from these rectifiers, in all but a few exceptional locations. At several of these locations, it was deemed advisable to drain small values of current. At several other locations in close proximity to the cathodic stations, where excessive values of current were found to be flowing on the distribution mains, it was decided to insulate and drain smaller values of current.

Leaks After Cathodic Protection

In examining the leak data, Table 1, it may be seen that there has been a total of 1396 leaks between the year of 1932 and the date of applying the first cathodic protection unit.

When these pipe failures are plotted out on a six-month cumulative basis, and not considering the many failures before a record was started in 1932, these failures fall very nicely on the curve of the equation $L = 50\ T^{1.5}$, where L=total cumulative leak failures and "T" the time in years, (see Fig. 2).

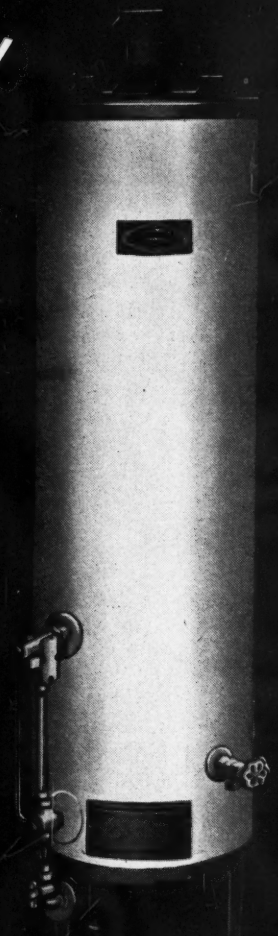
From the time of the first rectifier installation to date, the frequency of these failures decreases and the slope of the curve changes quite definitely. For this 16-month period the records show a total of 104 failures. If the rate had continued as per the equation $L = 50\ T^{1.5}$, as it did for the 10-year period before cathodic protection was applied, there would have been a total of 1710 failures, but since there have been only 1500 leaks, a reduction of 210 leaks in this 16-month period, was made.

The deterioration on this pipeline, which was rapidly approaching the limits of its useful life, has been materially reduced. Although the curtailment of some of the failures may be attributed to the reconditioning of several sections of the pipe, a part of the failures may also be charged to the changes in the internal pressure on the badly pitted condition of the pipe wall. Nevertheless, it is believed that cathodic protection has played a major roll in this lead reduction.

ACKNOWLEDGMENTS

The writer wishes to thank Fred D. Pyle, hydraulic engineer for the City of San Diego, for suggesting and affording material for this paper, and also to state that material was used quite freely from the report on the Bonita Pipe Line of Dr. Gordon N. Scott, pipeline technologist, of Los Angeles, Calif.

"I wish—"



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Index Published Covering Seized Enemy Patents

ABSTRACT information on seized enemy chemical patents are published in a 388-page supplement and a 360-page master index just announced by Alien Property Custodian James E. Markham.

The complete publication provides ready access to some 8000 patents, the bulk of which were issued to Germans. Such fields as metals and alloys, heavy and fine chemicals, oils and fats, explosives and plastics are covered.

It was announced that a similar program is being followed with the 37,000 seized mechanical, electrical and other non-chemical patents. Summary or abstract for each of these patents consists of a reproduction of one claim, one figure of the drawing, the patent number, the title of the invention, and the inventor's name and address. Two of four volumes have just been published and include patent office classes 1 to 150. The remaining two volumes are expected to be available during the next two months.

The complete sets of chemical and non-chemical abstracts may be purchased for $25 each from the Office of Alien Property Custodian, Chicago 3, Ill. That office will also supply prices of separate sections or classes of these abstracts.

Licenses under these patents are readily obtainable by any U. S. citizen for an administrative fee of $15. Alien Property Custodian offices, besides the main office in the National Press Building, Washington, D. C., are located at 120 Broadway, New York City; 17 Court Street, Boston, Mass.; 1350 So. LaSalle Street, Chicago ,Ill., and Guardian Bdg., Portland, Ore.

Montana and West Virginia Join Compact Commission

Although two more states, Montana and West Virginia, have joined the interstate oil compact commission and the scope and importance of the body is likely to be further widened, the Summer meeting of the organization, to be held at Oklahoma City Okla., June 15-16, will be simplified to give full cooperation with requests of the Office of Defense Transportation limiting the size of conventions.

At this meeting the Commission will extend its current study of natural gas problems, and papers and reports on various phases of the gas industry will be presented by nationally prominent gas authorities, Earl Foster, commission secretary, announces.

General Controls to Expand

General Controls Co., Glendale, Calif., manufacturer of electro-magnetic control valves, announces the completion of another step in an expansion program that will soon put three acres of factory space under roof. The immediate expansion includes a processing plant, with 10,000 sq. ft. of space, in which the heat treating, anodizing, mechanical deburring, sand blasting and painting departments are housed.

In addition, a new modern office building will soon be ready for occupancy. This building, will house the executive offices, the administrative, sales, advertising and sales promotion departments.

Testing activities in range room following rehabilitation.

Restoration of Laboratories Progressing Rapidly

IN spite of present shortages in materials and scarcity of labor, physical rehabilitation of the American Gas Association Testing Laboratories in Cleveland is well under way according to R. M. Conner, director. Numerous preliminary steps necessary before reconstruction could be started were completed more rapidly than had first been anticipated, he stated.

Repairs are well advanced and are nearing the stage when the offices which were completely destroyed can be reoccupied. In the meantime temporary quarters made available through the courtesy of the ASH&VE Research Laboratory have been utilized by the office staff.

In view of the extensive damage suffered by the north wing of the building, it is considered remarkable that testing and research activities have been able to be resumed on their present scale. Fortunately the portion of the building housing war operations was little damaged by comparison so that these activities could be resumed on a full scale shortly following the fire. In addition to the offices, the range, central heating and accessory rooms, as well as the chemical laboratory, were all very severely damaged. With the exception of certain test and inspection records, correspondence and other files were completely destroyed.

"The splendid cooperation of all concerned have made the rebuilding task an easier one," Mr. Conner said. He was particularly appreciative of the assistance extended by President Robinson and The East Ohio Gas Company, without which reconstruction would have been greatly delayed.

The principal portion of damaged testing and research equipment has been either replaced or repaired. All gas, water and compressed air lines in the various test sections have been put back into service. New colored concrete floors have been laid in the portion of the north wing housing the test section and windows throughout the building replaced as necessary. Heating and plumbing facilities as well as electrical and telephone conduits destroyed by the fire have been restored.

While plastering of the offices has been finished, partitions still remain to be installed before quarters can be occupied as formerly. Extensive replacement of face brick on the two walls of the north wing, directly exposed to the fire, will likewise be necessary. This together with other outside work, such as resurfacing of drives, restoration of fences and gates and planting of shrubbery, still remain to be completed.

Argus Assets Transferred

A plan by Northern Natural Gas Co., Omaha, Neb., to transfer the assets of Argus Natural Gas Co., Inc., to Peoples Natural Gas Co. has been approved by the Securities and Exchange Commission. Argus, which serves 15 communities in southwestern Kansas, will be dissolved.

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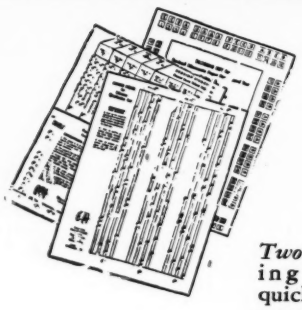

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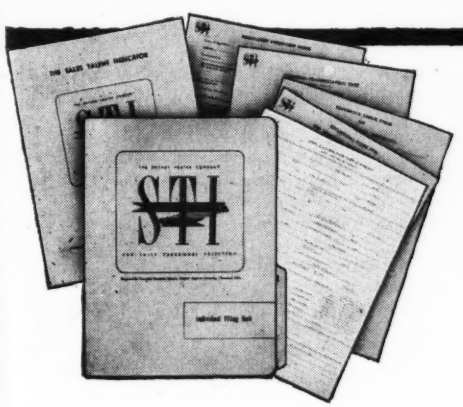
It has been in careful preparation for many months . . . the Bryant Sales Talent Indicator Plan that now is ready to help guide you in the selection of your gas heating sales staff!

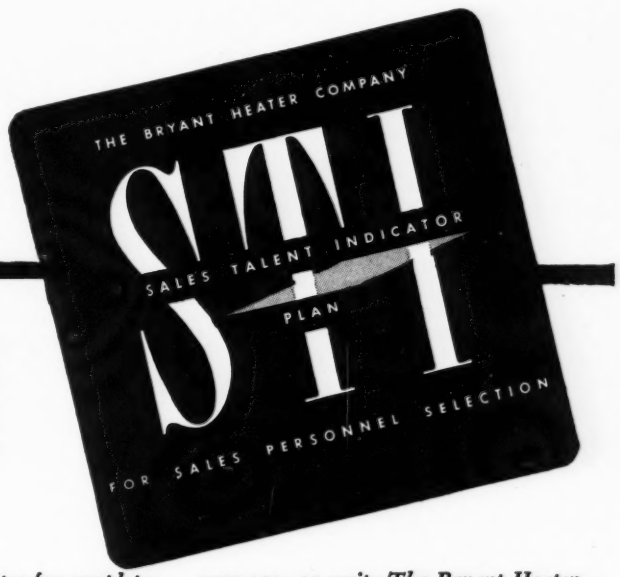
Created by the famed Personnel Research Institute of Western Reserve University, under the direction of Dr. Jay L. Otis, this plan is specifically designed to uncover the men best fitted to sell gas heating. It was built through preliminary testing of men actually engaged in this type of work, thus is a positive aid in pointing out the applicants who offer the best possibilities of duplicating the performance of the leaders. It can assist in making your postwar sales organization the most efficient and productive that you ever sent out to get the names of gas heating prospects on the dotted line!

Not limiting a final judgment to any one form of test, it checks applicants from all possible approaches. *A weighted application blank* produces basic employment data. *A regulated interview and rating chart* reveals personal characteristics and work history. *A salesman classification test* determines the applicant's trainability. Then, *the Bryant Sales Talent Indicator,* key test of the plan, indicates in 20 minutes whether the applicant has the sales characteristics required in a successful gas heating salesman, or is capable enough to warrant training for the job. And, if your type of selling also requires *mechanical aptitude,* there is a supplementary test to measure this ability in the applicant.

Plan now to learn the details of this tested sales personnel selection plan, and how it can help you. Set a date for the Bryant representative to make a personal presentation in your office. You will find the Bryant Sales Talent Indicator Plan a definite contribution to a more productive house heating sales force *for you!*



Test forms and blanks are supplied in sets, with an individual file folder for every applicant, giving a permanent record of each case.



Ask the nearest distributor for complete details on how the Bryant Sales Talent Indicator Plan is made available for your use—or write The Bryant Heater Company, 17825 St. Clair Ave., Cleveland 10, O. . . . One of the Dresser Industries.

Research Committee Funds Allocated

THE industry's new research and promotional program took tangible form at a meeting March 8 of the special commitee which will administer the funds raised by subscription of gas companies throughout the United States and Canada. At this first meeting since the fund was raised, it was reported that the financial goal of $1,400,000 had been passed and that additional funds were forthcoming.

Following a discussion of the ownership and use of any patents that might result from the research projects undertaken, particularly in the field of gas production, recommendations of various committees as to initial expenditures were reviewed and certain allocations of funds were made. Ernest R. Acker, chairman of the Special Committee on Gas Industry Research and Promotional Plan presided at the meeting which was held at A.G.A. Headquarters in New York City.

Research Projects

Special attention was paid to gasification research projects now under way or contemplated at the Institute of Gas Technology at Chicago. The projects authorized upon recommendations of the Manufactured Gas Department's Gas Production Research Committee, P. T. Dashiell, chairman, include:

1. Gasification of light hydrocarbons and of higher hydrocarbons.
2. Analysis of present equipment and processes.
3. Reactions between oxygen steam and carbon and sulphur removal. The project on oxygen reactions was tentatively approved subject to final disposition.

Recommendations of the Coordinating Committee on Research, E. P. Noppel, chairman, covering Domestic, Industrial and Commercial Gas, and General Technical Research Projects to be completed or undertaken during the Association year ending Sept. 30, 1945 were approved as submitted by Noppel's committee. Among the projects reported were:

Domestic Gas Utilization: Basic domestic gas research projects on cooking, water heating, gas burners and central gas space heating, which have been set up on a continuing basis from year to year and assigned to the A.G.A. Testing Laboratories, will be continued on an accelerated basis. In addition, the Committee on Domestic Gas Research proposes to conduct additional research projects on:

1. Pilot design, construction and performance.
2. Gas-operated summer-winter hookups.
3. Home humidity control and possibilities of developing an all-purpose gas cooking machine. The latter projects are being investigated, but have not been included in the recommended program at the present time.

Industrial and Commercial Gas Utilization: Active projects in this category which will be continued include:

1. Research in controlled vacuum heat treating.
2. The application of forced combustion to commercial cooking and baking.
3. Investigation of plug-in flexible connections for gas appliances.
4. Development of patch-type counter toaster. (temporarily inactive).
5. Improvement in non-ferrous metal melting through the application of direct radiant heat (temporarily inactive).

Subject to further investigation of facilities and development of detailed working outlines, the Research Coordinating Committee has approved projects in (1) Advanced studies in high speed direct heat-treating, and (2) Studies of various heat rays for transmitting heat and penetrating materials, both high and low temperatures. Funds will be requested for these projects later.

Gas Summer Air Conditioning: Funds for air conditioning research were allocated to complete a survey of water problems encountered with gas equipment and to participate in cooperative research in pressure losses in air ducts. The latter project is expected to establish reliable data on friction losses through air distribution ducts and fittings commonly used in domestic and small commercial air conditioning systems. It will be conducted by the American Society of Heating and Ventilating Engineers.

General Technical Research: Included among the approved projects in this field are:

1. Investigation of controlling and gauging combination wells.
2. Investigation of natural gas hydrates.
3. Completion of mixed gas research and development of standard test burners.
4. Organic sulphur research.
5. Iron corrosion fellowship.

Some of this work is being conducted by the U. S. Bureau of Mines, part at the A.G.A. Laboratories and the Institute of Gas Technology, while the corrosion fellowship covers work under way at Rutgers University.

National Advertising: Expanded national advertising plans, covering both the domestic and industrial and commercial campaigns, were approved as submitted by H. Carl Wolf, chairman of the National Advertising Committee.

Quarterly Progress Reports: It was decided that the Committees conducting research and promotional work underwritten from the new Research and Promotional Fund should provide the Special Committee with quarterly reports on progress made in their activities and expenditures as an aid to the Special Committee in meeting the responsibilities to companies contributing to the Plan.

Promotion: Chairman Acker announced that membership of the new Promotional Committee had been selected and that D. A. Hulcy, president, Lone Star Gas Co., Dallas, Texas, had accepted the chairmanship. This committee will meet shortly to lay out a program. George A. McDonald, for the past eight years public utility and railroad editor for *The New York Sun*, has been appointed director of publicity for the A.G.A.

Funds to be Audited: The Committee unanimously decided to make arrangements for the Association's auditors to make an unnual audit of the receipts and disbursements made during the operation of the plan.

It is now planned that the Special Committee will hold regular quarterly meetings for the purpose of considering progress to date in the activities which it has authorized and for the further purpose of considering any recommendations that may be submitted for additional activities to be financed from the new Fund.

Harper-Wyman Schedules New Advertising Series

A new series of full color, two-page advertisements is being launched by the Harper-Wyman Co., Chicago, makers of the Harper Burner System.

The first advertisement will appear in the April issue of gas industry publications, and will be reproduced in black and white in two of the trade papers on the list.

"What Woman Wills, Will Be" is the theme of the series. Each advertisement illustrates one advance toward the better way of living which came as a result of women's dissatisfaction with antiquated ideas or methods. The point is made that today women want gas ranges that are equipped with the Harper Burner System.

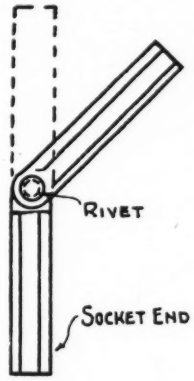
Artists of national repute, whose work appears in the pages of leading magazines, were selected to make the illustrations. Among them are William Cleaver, Ralph Crawley, Vincent Guise, Charles M. Hawes, Robert Patterson, and Kenneth W. Thompson.

OPERATING IDEAS

Hinged Socket Wrench

From A.G.A.'s "Report of Subcommittee on Wrinkles." W. R. FRASER, Michigan Consolidated Gas Co., Detroit, Chairman.

The wrench shown in the sketch is used to remove the orifice spud on tank water heaters. The wartime tank water heater is so compactly designed that it is impossible to apply the wrench to the orifice spud unless it is hinged. The wrench is partly inserted while held at a 90° angle then straightened and applied to the orifice spud in the regular manner.



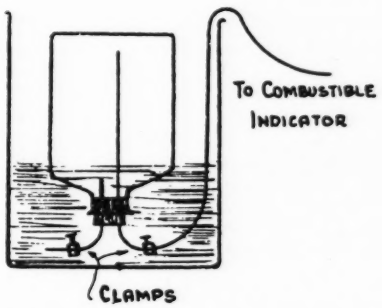
Calibrating Combustible Gas Indicators

From A.G.A.'s "Report of Subcommittee on Wrinkles." W. R. FRASER, Michigan Consolidated Gas Co., Detroit, Chairman.

Air-gas mixtures may be prepared for the calibration of combustible gas indicators by the use of apparatus shown in the sketch. The bottle (usually a 6 lb. acid bottle) is filled with water, the stopper and copper tubing put in bottle and bottle inverted on stand. Any desired gas-air mix can be prepared in the bottle by admitting gas and then air through the inlet tubing and measuring the water displaced by each through the outlet tubing. Always admit the gas first and then the air to provide proper mixing.

To calibrate the detector, connect rubber tubing to the long copper tube and immerse the neck of the bottle in water. Open the clamp on the short copper tube under water.

Check the indicator for zero, preparing it for use. The bottle is lowered into the water or the water level raised. The clamp is opened, allowing the copper and rubber tubing to vent. The rubber tubing is connected to the indicator and the gas-air mix aspirated into the detector. The water



level in the bucket and the bottle is maintained at an even level to hold zero pressure in the bottle.

An acid bottle full of gas-air mix gives enough mixture for two check determinations on the indicator and a zero check before each test.

Unattended Filtration

From A.G.A.'s "Report of Subcommittee on Wrinkles." W. R. FRASER, Michigan Consolidated Gas Co., Detroit, Chairman.

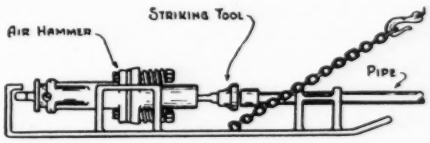
Solution requiring lengthy filtrations can be left to filter unattended by placing the solution in a separatory funnel of suitable size and assembling the apparatus as shown in the figure.

The solution feeds into the filter by air displacement. When filtration is completed, the filtrate may be washed by turning off the stopcock, introducing distilled water to the funnel and repeating the process.

Device For Driving Pipe

From AGA's "Report of Subcommittee on Wrinkles," W. R. FRASER, Michigan Consolidated Gas Co., Detroit, Chairman.

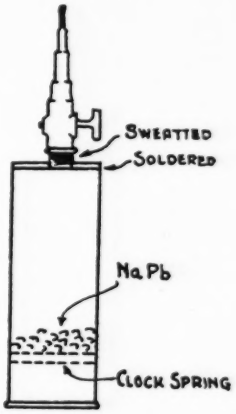
This device is a sled built with projections to properly hold a paving breaker in a horizontal position so that it can drive pipe in a horizontal direction. The paving breaker is fitted with a standard tamping



pad and the end of this pad is held tightly against the end of a length of pipe by means of the chains as shown. (This can be done by man power or winch power.) As the air is applied the tension presses the trigger on the gun. The sled moves forward as the pipe is driven.

Hydrone Testing

From A.G.A.'s "Report of Subcommittee on Wrinkles." W. R. FRASER, Michigan Consolidated Gas Co., Detroit, Chairman.



Recently, because tank purity of H_2 for regular testing was suspected, a hydrone generator was constructed. An old outside jacket tube of calorimeter burner assembly was used, soldering one end closed with a brass disc taken from an old clock spring barrel cover. This closed end was drilled and tapped for ¼-in. petcock, that was sweated in place to make it gas tight. A wide clock mainspring made an easily demountable, perforated platform to set about 1½ in. from bottom of generator for sodium lead pieces to rest on.

(Note:) When generating hydrone be sure to start with 1 in. of water in bottom of pail. This serves two purposes, (a) removes heat of chemical reaction, (b) seals lower end of the tube so that gas generated goes where expected.

Determining Air-Gas Ratio

From AGA's "Report of Subcommittee on Wrinkles," W. R. FRASER, Michigan Consolidated Gas Co., Detroit, Chairman.

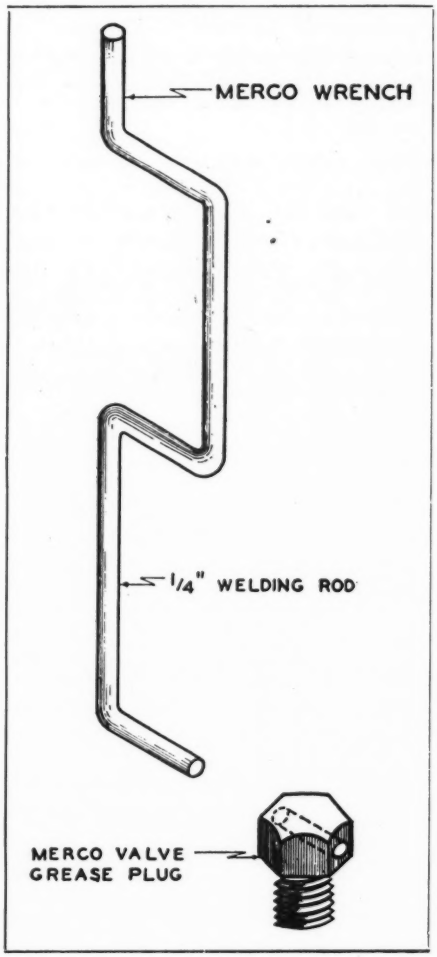
The determination of complete air-gas mixture ratios by direct analysis is sometimes inaccurate especially with mixes of relatively high B.t.u content. In these cases a more accurate determination of the ratio can be made by flue gas analysis if the gas combustion characteristics are known or can be calculated. Under conditions where it is difficult to obtain an undiluted flue gas sample a small auxiliary combustion chamber can be constructed. Analysis of the flue gases from the mixture burned in this chamber can be interpolated into accurate air-gas ratio figures.

Valve Greaser

GEORGE H. MASON, boilerman, Liberal gasoline plant, Panhandle Eastern Pipe Line Co., Kansas City.

This time saver for greasing Merco valves applies to the gasoline and compressor departments, and its use saves from 20% to 75% of the time required to grease these valves with a wrench.

All that is needed is a ¼-in. welding rod, and about 30 in. long, bent in the form of a brace. The rod is used as a brace to grease Merco valves in places that are hard to reach, such as



in header pits, under or between other pipes, pipe valve boxes where the valve is below ground level, etc. Merco valve grease plugs have a hole through the top, and the bent end of the rod is slipped through this hole. It is a simple matter to unscrew the bolt and lift it out. This gadget has saved many a knuckle from being skinned, thus definitely proving its safety value.

Dresser Opens New Offices In Cleveland and New York

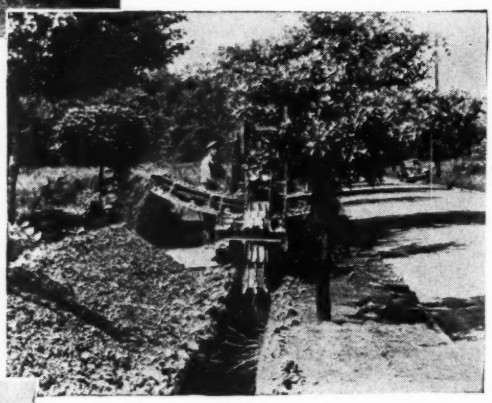
New centralized administrative offices of Dresser Industries, Inc., formerly of Bradford, Pa., will be opened March 19 at 1130 Terminal Tower, Cleveland, according to H. N. Mallon, president. The new offices will reduce executive travel time to the company's 18 different plants by providing a more central location for the company's headquarters.

Mallon also announced the opening on March 15 of consolidated domestic and export sales offices for the member companies of Dresser Industries, at 800 Chanin Building, New York City.

DEPENDABILITY
Another "CLEVELAND" Characteristic—

Because of their correct design and superior Quality Construction insuring ruggedness, strength, stamina and power "CLEVELANDS" can be DEPENDED on to carry through on the toughest jobs, as demonstrated in the illustration at left.

Because of their compactness, absence of bulk and dead weight, their quick shift conveyor and full crawler mounting "CLEVELANDS" can be DEPENDED on to overcome quickly the many handicaps encountered in digging Trench in congested areas. Note in illustration at right how "CLEVELANDS" travel along the tree lawn and sidewalk without damage and how easily the conveyor can be positioned to pass trees, poles or other obstacles.



"CLEVELANDS" because of their large number and wide range of speeds, their ease of mobility (truck or trailer) and their unsurpassed maneuverability can be DEPENDED on to get to the job and get the job done FASTER.

"CLEVELANDS" are backed by a DEPENDABLE Parts Service, so important to all machinery users. CLEVELANDS awareness of this vital service is shown by its maintenance of unexcelled parts service under present war conditions.

You can DEPEND on "CLEVELANDS" too, to maintain its leadership in the Trenching Machine Field in the post-war era.

THE CLEVELAND TRENCHER COMPANY
20100 ST. CLAIR AVENUE • CLEVELAND 17, OHIO

CLEVELANDS
MAKE THE EARTH FLY

CURRENT READING

Thermodynamics of Reactions Involved in Production of Hydrocarbon Liquid Fuels—A comprehensive report giving selected "best" values of the thermodynamic properties for a number of reactions fundamental to the production of hydrocarbon liquid fuels from natural gas or coal and hydrogen appeared in the February number of the Journal of Research.

This report (RP1634), by Donald D. Wagman, John E. Kilpatrick, William J. Taylor, Kenneth S. Pitzer, and Frederick D. Rossini, was prepared jointly by the thermochemical laboratory and the American Petroleum Institute Research Project 44 at the Bureau.

A Series of Enthalpy-entropy Charts for Natural Gases by G. G. Brown, American Institute of Mining and Metallurgical Engineers, Technical Publication No. 1747, 29 West 39th Street, New York 18. Enthalpy-entropy diagrams are presented for natural gases of 0.6, 0.7, 0.8, 0.9 and 1.0 gravity over the pressure range of 5 to 10,000 lb. per sq. in. and temperature range of 32° to 700° F. The charts indicate directly the work requirement and temperature rise for adiabatic compression or temperature change for free expansion of natural gases.

Internal Corrosion of Tubing in Gas-Condensate Wells Measured by Recording Calipers—E. H. Short, Jr. "Oil and Gas Journal," Jan. 6, 1945, pp. 46, 47. This article describes an instrument which can be run inside the tubing strings under closed-in pressure to determine the magnitude of corrosion pits. The tool has been successfully used to survey 12 Cotton Valley Operators Committee wells, and while the caliper is still in the development stage, it has possibilities for rendering a valuable service.

Prediction of Conditions for Hydrate Formation in Natural Gases by D. L. Katz, American Institute of Mining and Metallurgical Engineers, Technical Publication No. 1748, 29 West 39th Street, New York 18. In this article are a series of curves showing the permissible expansion of gas from various pressures to other pressures without forming hydrates. This will be of interest not only to the gas industry but to the oil industry and anyone handling high pressure gases.

The Migration and Accumulation of Petroleum and Natural Gas—F. M. Van Tuyl, B. H. Parker and W. W. Skeeters. Jan. 1945 "Quarterly" published by Colorado School of Mines. The publication comprises 112 pages and includes four illustrations and a bibliography of more than 100 references. Following a discussion of the extent, character, and time of migration, the factors bearing on the problem are analyzed, and prevailing theories on migration and accumulation are then reviewed and weighed in the light of evidence gleaned from the literature and opinions of leading petroleum geologists. The research resulting in the publication was done under the sponsorship of the research committee of the American Association of Petroleum Geologists.

Experimental Determinations of Water Vapor Content of a Natural Gas Up to 2000 Pounds Pressure—G. F. Russell, R. Thompson, F. P. Vance, and R. L. Huntington. "Petroleum Technology," Jan., 1945. 7 pp. With the advent of higher pressures in the operation of natural-gas transmission lines, the removal of water from the gas has become increasingly important in order to prevent condensation or formation of gas hydrate from slowing down or stopping the flow of gas. Intelligent design of these dehydration or gas-drying plants has been hampered through the lack of experimental data on the water vapor content of natural gas at elevated pressures. In view of this need, this investigation was sponsored by the Southern Natural Gas Co. in the chemical engineering laboratories at the University of Oklahoma Research Institute. Experimental results were obtained on the water-vapor content of natural gas up to 2000 lb. per sq. in. at atmospheric temperatures. The water vapor content at 2000 lb. is approximately two-thirds as much as it is at 1000 lb. Deviations from the ideal gas laws vary directly with pressure and indirectly with temperature.

YOU can cut Transite Flue Pipe right on the job! It's light in weight, goes up readily, needs very little support, requires no paint. Customers stay sold because the job is neat-looking . . . and completely rustproof.

Transite Flue Pipe is made in both round and oval shapes, in sizes to fit all normal requirements. A complete list of fittings and accessories is available.

For complete information write today for booklet TR-13A. Address: Johns-Manville, 22 East 40th Street, New York 16, New York.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville

TRANSITE FLUE PIPE
For venting gas-burning appliances

TRENDS AND COMMENT

SELECTING SALESMEN

A sales executive says, "You Can't Pick Salesmen by Statistics." Then offers Three Constructive Suggestions.

There is much talk lately of the *weighted* application for use in selecting salesmen. One article on this subject appeared in *Printers' Ink*, Jan. 26 1945.

The present discussion seeks to incorporate the principle thoughts of George W. Wilson, vice president, International Correspondence Schools, Scranton, Pa. who replied to the article mentioned above in *Printers' Ink*, March 9, 1945, p. 19.

Selecting 91 salesmen, chosen for over-all qualities demonstrated over a long period of time, Wilson applied to them the following factors: age when employed, marital status, dependents, property, insurance, height, weight, time out of work, selling experience. Education was eliminated because of incomplete records, but figures available showed almost exactly even distribution among (1) some high school, (2) high school grads, (3) some college, and (4) college grads. Result was that the ideal salesman turned out as follows:

Age	31-35
Marital status	married
Dependents	0
Property	Under $1000
Insurance	Yes
Height	5' 6" to 5' 8"
Weight	140-160
Unemployed	None
Longest job	2-5 years
Selling experience	Over 5 years

Then Wilson asks, *"Is it not possible—contrary to the long established practice of us all—that these physical and historical statistics are not the most important things about a man?*

The article continues: "Instead of asking how old a man is, I'd like to know how *active* he is . . . especially how mentally active, how *teachable*. Instead of his former schooling, what has he done since school to keep learning and keep growing? . . . "More important than his experience—in selling or other fields—what about his *attitude*, his mental habits, his temperament, if you like?

Wilson then makes three constructive suggestions, which we take the liberty of quoting from the March issue of *Printers' Ink*.

"1. *More attention to temperament and personality*. I do not mean by this that we should necessarily reject the selfish, the stubborn, the introverted, the emotionally unbalanced applicant. And certainly not that we should hire only the lads with that quick "How-to-Win-Friends" grin! Rather that if we know more about these vitally important *individual differences*, we can vary our handling of new men accordingly and save many a man who might otherwise fail? There just won't be enough 'ideal' men to go around. There never were.

"2. *More training in salesmanship fundamentals*. Of course it's obvious that all new men, experienced or not, need advance training on your products and policies. But we have also found that experienced and even 'successful' salesmen profit greatly from training-on-the-job in such basic elementals as personal efficiency, sales psychology, suggestion vs. argument, etc. It's remarkable how many experienced men prove to be experienced in the *wrong* methods.

"3. *More—and better—sales management*. Not the least important is the amount and kind of *direction* you are going to give to your expanded and partly green field staffs. And I really mean direction—frequent, specific, and in detail—and not exhortation or stimulation. Even an average man does a better-than-average job if he has a better-than-average selling plan to work on. I know of one big company, in the direct sales field, that devised a plan for canvassing several prospects at once and more than doubled its sales-per-man! Big ideas like that come rarely, but even little ideas are better than big pep talks for making good salesmen out of run-of-the-mill applicants."

PUBLIC RELATIONS

An inaccuracy oft repeated becomes the "truth." Industry must get the facts firsthand to the writers of books.

Not long since, a large industry discovered by means of a scientific sampling of public opinion that its reputation was surprisingly sub-standard among younger people in a certain state—its rating with this one group being far below the average for its whole territory, and below that for other age groups in the same state.

Search for an explanation led to text-books used in recent years in the public schools of that state, which were found to present the industry, quite inaccurately, in a rather disruptable light.

"When a newspaper reports industry inaccurately," said the public relations officer involved in this experience, "no great harm may be done if such errors are not repeated—but when a standard text-book or reference work shows us, even once, in a bad light, the harm just never ceases. The error becomes the standard belief of a generation of students.

Industry has largely overcome the mistinterpretation which arose before it made industrial information easily accessible to the press, *but it still has before it the equally important job of achieving accurate interpretation at the hands of the writers of books.*"

By coincidence, just at the time when this problem of securing accurate interpretation in books has been engaging the attention of public relations men—it has also aroused the interest of reputable scholars, several of whom have openly admitted their dissatisfaction with the degree of completeness and accuracy attained by most scholarly recordings of industry's behavior.

By way of extenuation, however, these scholars point out that their professional standards require them to work with original documents, and there is a scarcity of such material available to witness the constructive side of business achievement—though there is no lack of records of governmental investigations of business, which usually disclose little but its pathology, omitting the positive side.

To bridge this mutually-injurious chasm between responsible scholarship and useful industry, an informal but widespread movement is now under way to effect a closer liaison between the two parties, both of whom desire to get the truthful and significant facts about business before the public.

Information as to what has been accomplished in this direction, and how the individual business may go about doing its part to make available to reputable authors of scholarly works the actual facts of its accomplishments, may be had by any industrial executive or public relations officer upon inquiry to Stanley Pargellis, Newberry Library, Chicago; Thomas C. Cochran, New York University; Arthur H. Cole, Baker Library, Harvard University; or R. Norris Williams II, Pennsylvania Historical Society, Philadelphia.

VISUAL MERCHANDISING

Merchandising Specialists of Goodyear Tire & Rubber Co. are Now Studying Plans for Construction and Modernization of Dealer Stores.

Goodyear believes that merchandising appeal must not be confined to the shelves inside the store, but must dominate the over-all property. And ideas for postwar use are being developed today by the store planning and display department in Akron for the company's 36,000 dealers.

Staffed by men with years of experience in display and merchandising, the department's program includes design for merchandising, fixture and equipment development, store planning and design, display materials, methods of pricing, interior displays, display promotion plans and display materials.

Store layout, an important part of the service, will be supported in the field by "merchandising engineers" who will work directly with dealers. The field man will make recommendations, secure sketches and layouts from Akron; and after approval of the plan by the dealer, will supervise the actual installation, even to the arrangement of merchandise on the fixtures. He will keep in touch with the dealer, make sure that the store remains "sales conditioned" and that new ideas for increasing sales are acted upon.

In formulating store construction plans and designs Goodyear and its dealers must consider the use of such plans in existing buildings and also in new ones. Where a long-time lease is available and the location is a proven one, Goodyear has available for its dealers a complete modernization program. A number of the company's prominent dealers have already completely modernized; others are making arrangements to do so as soon as materials can be obtained.

Goodyear is working on plans for a type of building construction which will take advantage of the latest developments in steel construction. The building will be light, yet strong, and economical to build. It will be free of troublesome posts or columns in the productive space.

Porcelain is suggested for the front, sides and even the rear exterior because it is especially pleasing to the eye, it can be obtained in most colors, and it is self-cleaning or easily cleaned.

The use of porcelain all around is proposed if the structure is in the open and visible from all sides. An outlet in a closely built up location hemmed in by buildings, would use porcelain or some other material, such as glass or stucco, only on the front and possibly the interior walls.

Within the building, construction and merchandise arrangement would allow for what Goodyear calls its "open type" store. This provides 100% visibility of the store's interior from the sidewalk. More wall space is available in this store and the display window—the low bulkhead type—is a picture by itself with no disturbing elements entering the background. The wall display runs from the rear of the store right out to the window glass instead of stopping behind the usual high bulkhead as most displays do. The display window has a platform which serves both as a window and as an interior display. The customer can walk around the display, view it from all angles and in the process of buying serves to attract attention from the street.

The tire dealers' stores of the future, Goodyear merchandising men say, will stress flexibility. Flexibility of construction, will make it possible for a store to be used for most any retail selling operation, and to be adapted to almost any location.

In the Goodyear Tire & Rubber Company's "Visual Merchandising Laboratories" in Goodyear Hall, Akron, the Dealer Store Planning and Display department uses miniature fixtures to arrange store layouts. If a layout "proves up" after thorough study and testing, it practically guarantees that the dealer is able to place a maximum amount of merchandise in a minimum amount of space.

NEW RADIO SHOW

San Diego Gas & Electric Sponsors Half Hour Program, G. I. Joe-Civilian.

The San Diego Gas & Electric Co., San Diego, Calif., is sponsoring a new half-hour radio show entitled "G.I. Joe—Civilian". The program is broadcast each Wednesday evening from 8:30 to 9:00 p. m. over KGB and is aimed at helping thousands of returning servicemen to become acquainted with the provisions of the G.I. Bill and other veterans' legislation. Servicemen are brought before the microphone to ask questions about their future and how the legislation will affect them in each case. Three experts, selected from a group of leading bankers, lawyers, title insurance executives, doctors, etc., will be on hand to answer questions in the light of the latest interpretations of the measures. A summary of each broadcast will be furnished listeners on request.

QUESTIONNAIRE

Clear, Concise, and Simple, it Lured at Least One Consumer into Answering.

Last month Shell Oil began worming its way into our consumer heart. It sent us a questionnaire, asking us what we liked or disliked about their service stations. Ordinarily we toss such things into the "file." We do this by way of getting even with the people who do the same thing to the questionnaires we occasionally send out. But this one we didn't. It was clear, simple, concise, and it took only two minutes. We sent it along in the postage free envelope.

THE GIRL WITH
Millions of Dates
FOR YOU!
"YOUR PRESENT AND FUTURE CUSTOMERS ARE ON MY LIST"
OVER 20,000,000 READERS OF SUNDAY MAGAZINES ARE LINED UP TO MEET ME
THERE'S A WHOPPING BIG LIST OF SUNDAY NEWSPAPERS REACHING 3,000,000 MORE
I'LL OPEN THE DOOR FOR YOU TO OVER 7,000,000 IN THESE BIG-CIRCULATION MAGAZINES
This Week
SUNDAY
DES MOINES SUNDAY REGISTER
THE AMERICAN WEEKLY
Florida Times-Union
THE HOUSTON CHRONICLE
THE NASHVILLE TENNESSEAN
The Providence Journal
GOOD HOUSEKEEPING
AMERICAN HOME
FARM JOURNAL

Big Nationwide Advertising Campaign Gives You A Head-Start On Postwar Sales of Florence Gas Ranges

DEMAND for postwar Florence Gas Ranges isn't going to be left to a hit-or-miss, last-minute rush. Florence aims to have demand built up, *ready and waiting for you* as soon as the war ends.

That's why Florence is starting right now . . . this month . . . a big advertising campaign that will smooth the way for you in homes of your present and future customers. Even allowing generously for duplication, 8 out of 10 families able to buy Florence Gas Ranges will be meeting Florence in 1945 . . . through leading big-circulation magazines and newspapers. All ads are packed with "personality" . . . Florence herself featured in a way that's bound to make your customers remember the Florence name and products.

After the war you'll see the results and you'll share in them through increased sales of the thrilling new models of Florence Gas Ranges.

FLORENCE STOVE COMPANY . . . General Offices and Plant: Gardner, Mass. Western Offices and Plant: Kankakee, Ill. Sales Offices: One Park Avenue, New York; 1459 Merchandise Mart, Chicago; 53 Alabama St., S. W., Atlanta; 301 No. Market St., Dallas.

FLORENCE
Gas Ranges

SELLING THE COMPLETE HOUSE POSTWAR

The "Architectural Forum's" Plan for Long Term Financing of Appliances

THE plan developed by *The Architectural Forum,* is one under which household equipment such as ranges, refrigerators, automatic cycle washing machines and other essential home operating equipment can be installed in the home and financed under the real estate mortgage. Twin objectives of the complete house plan are emphasized in the table.

Is This Plan New and Revolutionary?

There is nothing inherently new in the idea of financing operating equipment in the home under the realty mortgage. Savings and loan associations, savings banks, life insurance companies and other lending institutions have for years financed household equipment, along with 71 other types of easily removable real estate items such as venetian blinds, ventilating fans, conversion oil burners, stokers, water heaters, screens and water pumps, as part of the realty mortgage. In Washington, D. C., for instance, it has been common practice to include refrigerators and ranges in house financing.

The Problem

Though equipment financing under the realty mortgage is not new, its use, prior to the war, was confined to a few areas and to, at best, one or two items of equipment.

Most builders in the past offered the public a stripped-down shell without ranges, refrigerators and washing machines.

Because of lack of knowledge of the plan's availability by both builder and banker and because of inertia and reluctance on the part of the average builder to break traditional marketing patterns, this equipment was left out. The situation would be like a refrigerator manufacturer who provided a box without freezing trays and expected the purchaser to buy these items independently. The home owner found himself limited in his acquisition of new operating equipment by his ability to meet a series of high-priced, short-term commitments.

The Forum's Program

Initially, *The Forum* met in New York with a group of key household appliance manufacturers to discuss this program. There was general agreement that if the practice of including operating equipment under the realty mortgage was extended, builder sales would be greatly stimulated. It was further felt that the sale of equipment for new houses would aid in establishing standards for the replacement market.

The Forum was asked to explore the possibilities of gaining acceptance for the program. It conferred with key men in building, finance and government. The timing proved right. Many of them felt that the predicted million house market would not materialize unless the public was offered a moderately priced, completely equipped home purchased under a long-term single payment plan.

We reported our findings at a second conference in Washington, D. C. The guest list was expanded to include other first-line manufacturers and allied associations. The Washington meeting enlarged the success of the first meeting and *The Forum* agreed to develop a detailed program.

Basically, the program involved upsetting two popular credos:

1. That home operating equipment cannot be considered as part of realty because it is not permanently attached to the structure. Actually, a door, lighting fixtures and shutters can be removed as readily as, for example, a Bendix Washer.

2. That this equipment cannot be financed under the long-term mortgage because it will wear out before the rest of the house. Actually, paints, screens and linoleum have a shorter life than a refrigerator. Quality ranges last as long as hot water heaters, furnaces and roofs.

Selling the Second Half Million

To acquaint the building industry with the program, *The Forum* (19 W. 44th St., New York 18), published a pamphlet titled "Selling the Second Half-Million" which has been nationally distributed by manufacturers and utility companies.

It reveals, for the first time, the liberal position taken by FHA, the government agency which insured private mortgage funds. To date, 42 state FHA offices have declared ranges eligible for insurance under the realty mortgage; refrigerators in 41; dishwashers in 40; garbage disposals in 34 and automatic washers in 18.

To supplement the pamphlet, representatives of *The Forum* have spoken at electric utility sponsored builder and banker meetings in Buffalo, Kansas City and Cleveland and gas utility sponsored meetings in Hartford and Boston with future engagements in other key cities.

Progress

So great has been the response to the Complete House plan that it has lifted itself, almost unaided, into a national movement. Publications such as *American Builder, Electrical Merchandising, National Real Estate Journal, Air Conditioning and Refrigeration News* and *Electrical Dealer* have featured the program. Future articles are scheduled in *National Furniture Review, Retailing and Hardware Age.*

Progressive builders sense the possibilities of greatly increasing sales since a completely equipped home can be offered with only a negligible increase in monthly payments.

David Bohannon, one of America's leading builders, sees this program as a major realizable improvement in the postwar home and as an effective means of fighting the propaganda of the "all plastic house."

Savings banks and building and loan associations view the plan as a means of vastly stimulating their mortgage business and also as a means of getting a share of equipment financing long denied them.

R. S. Brewer, vice president of Wheeler Kelly Hagny Trust Co., a leading lending institution of Wichita, considers it "the best step yet suggested for improvement of the mortgage business."

The trend toward including the cost of basic household equipment in the original home mortgage is regarded by many manufacturers as a progressive step toward providing a higher standard of living for an increasing number of people.

OBJECTIVES OF THE PLAN

1. **To open up the new house market to manufacturers of ranges, refrigerators, washing machines and other essential home equipment.**

2. **To stimulate new house sales. It is our conviction that a million house market is not in the cards unless the public is offered a better house at a better price. For one, this means a completely equipped house that can be purchased under a single payment long-term plan providing monthly payments the man on the other side of the tracks can afford to pay.**

POSTWAR NOTES and NOTIONS

By STANLEY JENKS

Facing Facts

One of the gentler critics of this page has suggested that I am taking the postwar claims or threats of our competitors far too seriously. Who, me? He must have me mixed up with Winchell or somebody, because if anybody has taken special pains to expose these *plastonic* phantasies as sheer, unadulterated and unsliced baloney, it has been this gasman.

From my particular vantage point as a former utility man, and still very much interested in the gas industry, it is my special job at this time to study what is really going on in competitive circles and evaluate its over-all effects one way or the other.

You know, the only lad who is blinder than the fellow who cannot see wood for trees is he who cannot see a tree after he has crashed into it. The milder term for that kind of blindness is complacency.

The gas industry, with unquestionably the best fuel service on this earth, protected by its public utility status, has watched electric ranges connected along its mains; off-peak water heaters installed where a gas water heater could do a more satisfactory job; oil burners and coal stokers take over a major share of the thermostatically controlled central heating load; and electric refrigeration given such a head start that even such a natural for gas service as central air-conditioning is by no means in the bag.

And I am accused of taking competition too seriously.

Hard Fight Ahead

In battle, it is fatal to under-estimate your enemy. In the forthcoming battle of the fuels, any manufactured gas man who doesn't appreciate that he is facing the fight of his life had better start limbering up before his muscles are too atrophied.

But look at our national advertising, our million dollar research and development program, and our coordinated kitchen campaign, you say. All right! Look at them, and beyond them too. Look at the gas company income statements and balance sheets. Look in the cash registers, and look in the minds of investment bankers and investors—and what do you see? You see a great big question mark. It really sets you wondering why anybody who has seen thousand-year-old cathedrals and castles crumble into dust and debris in a few minutes when hit by a bomb would think a hundred-years-old or so industry like ours must continue solely because it is old and established.

There are many intelligent men in the gas industry who are planning and striving to restore to the gas industry the public indispensability it must earn and then protect against the encroachment of other customer-hungry fuels. These are the men who can see the wood for trees, and they are the sons of the men who knew that the railroad train could and would replace the stagecoach.

And why was I gently criticised? Because last month, I implied concern because in their automatic postwar heating plans, the National Association of Home Builders at their Chicago convention in January were mostly in favor of oil burners and coal stokers.

And gas heating is so much better. We know it, but does the public? Apparently, the members of the National Association of Home Builders don't know it.

Home Heating

For example, here is a postwar fact to be faced. We already know there are several electrically heated homes in the San Joaquin Valley in California, where there is summer pumping load to offset the winter heating peak. Around 30 electrically heated homes were added to the lines of the Portland General Electric Co. in Portland, Oregon, 1940 and 1941, and more would have been added but for wartime restrictions.

The Tennessee Valley authority has over 1000 electrically heated homes on its system and is planning to add 10,000 more as soon as equipment is made available.

The average annual electric heating cost in Portland, Ore., is $75.74 at present rates, and we are told that properly insulated, the annual heating cost ranges from $39.20 for a five-room house of 6,800 cu. ft. to $134.51 for an eight-room house of 11,230 cu. ft. Mind you, this is in a territory where sawdust and wood have always been the popular fuels.

In Portland, it is conceded that the business is not profitable at present rates until a corresponding summer load is obtained.

The Bonneville Power Administration has set its sights at approximately 25,000 electric home heating jobs by 1950. They point to initial equipment costs of $400, compared with (their figures) $500-$600 for oil or gas. They claim adequate generating and line capacity and the 25,000 electrically heated homes will yield approximately $1,000,000 in added annual revenue.

I know it sounds cockeyed and economically ridiculous, and the immediate threat beyond these tax-financed and tax-supported systems is still remote.

But the facts are, they are seriously planning to do it. The trend itself is threatening, and we with a better fuel must face the facts and find an answer.

Free Enterprise

The throttling effects of government control are well illustrated by the situation developing in Great Britain. Some bureaucracy in London has been charged with the design of a postwar standardized house to replace as quickly as possible the hundreds of thousands of homes bombed out of existence or needed after almost six years of no new construction.

The question of summer water-heating equipment came up. The bureaucrats specified an electric immersion heater installed in the tank, coal-heated in the wintertime. The gas industry went to bat and proved conclusively that a wall-type instantaneous heater would do a better job and cost less to install and operate.

The bureaucrats, however, are unmoved and—characteristically the world over—immovable too.

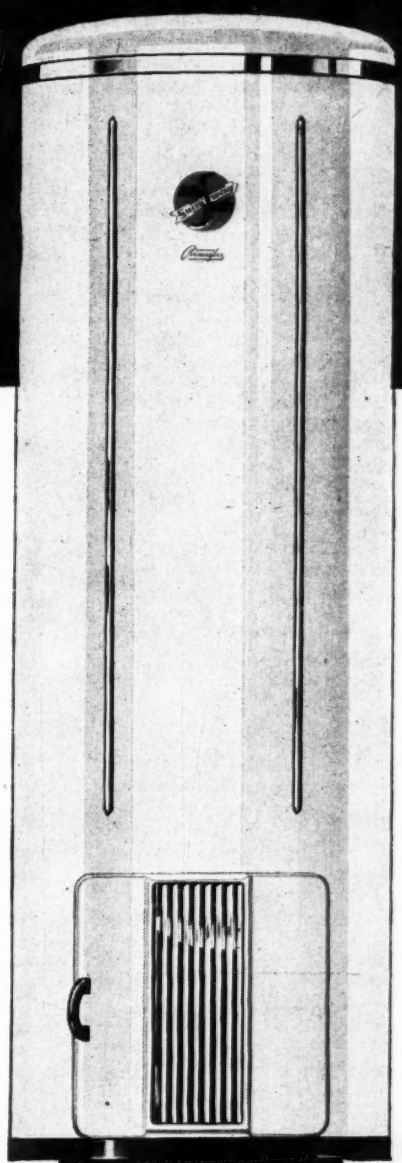
Free enterprise with a minimum of bureaucratic interference is a goal worth fighting for.

Subterranean Tests *Prove* Permaglas Protects

THOUSANDS of specimens of glass-fused-to-steel were buried in earth of all types from all states, to guide A. O. Smith engineers through 23,000 test-years in developing *Permaglas* . . . the sparkling blue, mirror-smooth glass exclusive with SMITHway Gas Automatic Storage Water Heaters.

No other water heater offers *Permaglas* advantages. There is no substitute for the long years of research and testing, devoted to the development of *Permaglas.* Chemical and metallurgical engineering experience, exhaustive research in glass, long production experience, special machinery, new processes and facilities, available nowhere else except in the huge A. O. Smith plants, contribute to *Permaglas* success. It assures hot water as clear and pure as the original water supply itself, *always.*

To help you sell more of these modern, long-life, gas water heaters, write for "The Inside Story of *Permaglas*" —a great aid to sales.



"Heated with Gas, Stored in Glass"

A. O. Smith Corporation,
Dept. GA445H, Milwaukee 1, Wis.
Please send me a copy of "The Inside Story of *Permaglas.*"

Name.....

Title.....

Company Name.....

Address.....

SMITHway Permaglas
GLASS LINED
TRADE MARK REG. U. S. PAT. OFF.

ASSOCIATIONS

Hulcy Appointed Chairman A.G.A. Promotion Committee

D. A. Hulcy, president of the Lone Star Gas Co., Dallas, has been appointed chairman of the newly-created promotional committee of the American Gas Association, it is announced by J. French Robinson, president of the Association.

The promotional committee will supervise the activities of the promotional bureau shortly to be organized at A.G.A. headquarters as part of the enlarged research and promotional program underwritten by the gas industry. Personnel of the committee, which will be announced shortly, will include representatives of the various sections, departments and interested committees of the Association, as well as members at large representing the best promotional talent in the industry.

The program contemplates appointment of a full-time promotional director on the A.G.A. staff and greatly enlarged gas advertising and promotional activities.

A member of the Lone Star staff since 1920, Hulcy advanced from executive vice-president to president in 1940. The Lone Star System embraces more than 300 towns and cities in Texas and Oklahoma.

Subjects Outlined For Canadian Convention

The tentative program of the 38th annual convention of the Canadian Gas Association, to be held June 19th-22nd, 1945 at Murray Bay, Quebec, Canada, includes:

1. Some of the gas industry's most outstanding developments, and how they will fit into the postwar period ahead.

2. Developments in research, gas appliance manufacture, sales promotion plans, "New Freedom" gas kitchens.

3. Question box topics and problems of vital interest to Canadian gas men.

Speakers will include R. M. Conner, George S. Jones, Jr., A. W. Given, H. Vinton Potter, Miss Jessie McQueen, and E. Carl Sorby.

C. R. Bellamy To Head A.G.A. Industrial Research

Charles R. Bellamy, chief engineer, gas department, Columbia Gas and Electric Corp., and vice president, Columbia Engineering Corp., has been appointed by J. French Robinson, president, American Gas Association, to the chairmanship of the committee on industrial gas research, and succeeding John W. Batten of Detroit.

Bellamy, a graduate of Lafayette College in Chemical Engineering, has been a member of the industrial research committee for three years, and previously was chairman of the joint committee on gas summer air conditioning of the industrial and commercial gas section and residential gas section. He is a member of the American Institute of Chemical Engineers.

Bellamy for 12 years did engineering work for Semet-Solvey Co. in different parts of the country. During the latter part of this period he was gas engineer for all Semet-Solvey plants.

As a private consulting engineer from 1923 to 1929 he specialized in gas manufacturing problems, coke oven design, and designed several of the largest benzol plants in the country.

Serving with Bellamy on the Committee on Industrial Gas Research will be the following: Karl Emmerling, The East Ohio Gas Co., Cleveland; John B. Frost, The Brooklyn Union Gas Co.; Charles C. Krausse, Consolidated Gas Electric Light & Power Co. of Baltimore; J. P. Leinroth, Public Service Electric & Gas Co., Newark N. J.; E. F. Schmidt, Lone Star Gas Co.; R. G. Taber. Atlantic Gas Light Co.; Eugene D. Milener, Secretary, A.G.A.

Laboratories Plan Mixed Gas Research Bulletin

The Mixed Gas Research Committee, a joint committee of the Natural Gas Department and the Technical Section, is submitting to the gas industry for criticism new mixed gas research data, preparatory to publication of the findings in bulletin form.

Latest studies conducted by the A.G.A. Testing Laboratories staff under the sponsorship of the committee encompass substitution of gases with heating values ranging from 800 to 1800 Btu per cu. ft. for three different base natural gases of high heating value, high methane content, and high gravity combined with high enert content, respectively. New interchangeability equations have been developed which take into consideration flash-back, lifting and yellow tip limits of adjustment and substitute gases. Mathematical methods of determining these characteristic limits have also been outlined. Graphical interpolations of formula factors, formerly complicated and time-consuming in calculation, will make possible complete solution of equations with nothing more than simple addition.

These new data when published will supplement previous mixed gas research studies on base manufactured gases to include mixtures of higher heating values as well as utilization of butane-air and mixtures of butane and city gases to meet fluctuating demands.

Two A.G.A. Personnel Conferences Held

Two AGA Personnel Conferences have recently taken place. The first, the Southwest Personnel Conference, held its eighth meeting March 6 in Shreveport. M. V. Cousins, personnel director of the United Gas Pipe Line Co., was chairman. Seventeen members were present, representing nine companies. The following subjects were discussed: Revised selective service regulations, foremanship training, wage stabilization, and experiences with the WLB. C. V. Hussey of the Arkansas Power and Light Co., gave a talk on "Job Analysis and Job Evaluation" during the afternoon session.

The second, the Midwest Personnel Conference, of which R. B. Harkins, personnel director of Panhandle Eastern Pipe Line Co., is chairman, held its third meeting in Kansas City, March 8. This meeting was attended by Kurwin R. Boyes, secretary of the A.G.A. and 23 other delegates representing 17 different gas companies from the five midwestern states included in this conference. Boyes outlined how the Association is now handling industrial relations for the gas industry and what the plans are for the immediate future.

A report from the Job Analysis Committee was presented by C. C. Jolley of the Natural Gas Pipeline Company of America and T. M. Campbell, member of the Industry Advisory Council of the Seventh Regional War Labor Board, gave a talk on the functions of that agency. The next meeting of this conference will be held in May.

Rocky Mt. Ass'n Opens Offices In Casper

Permanent offices in Casper, Wyo., have been established by the Rocky Mountain Oil & Gas Association, recently reorganized. The following officers have been elected: President Paul Stock, independent operator, Cody, Wyo.; First vice president, James Donoghue, president, Mackinnie Oil & Drilling Co.; Second vice president, A. B. Cobb, owner of Home Oil & Refining Co., Great Falls, Mont.

SCMA Outlines Meetings

A technical paper "Water Treatment is Becoming More Important to Engineers" and the subject "Relation of Athletics to the War Effort" will be presented before the April meeting of the Southern California Meter Association.

V. A. Hammett of the Permutit Co. will give a brief outline of one of the present day methods of treating water for use as boiler feed water, cooling tower water and other uses.

The March meeting heard a paper presented by L. F. Richardson of Bailey Meter Co. on the Harbor Steam Plant. The May meeting will feature "Past Presidents Night" and the June meeting will be the Association's "Low Jinks".

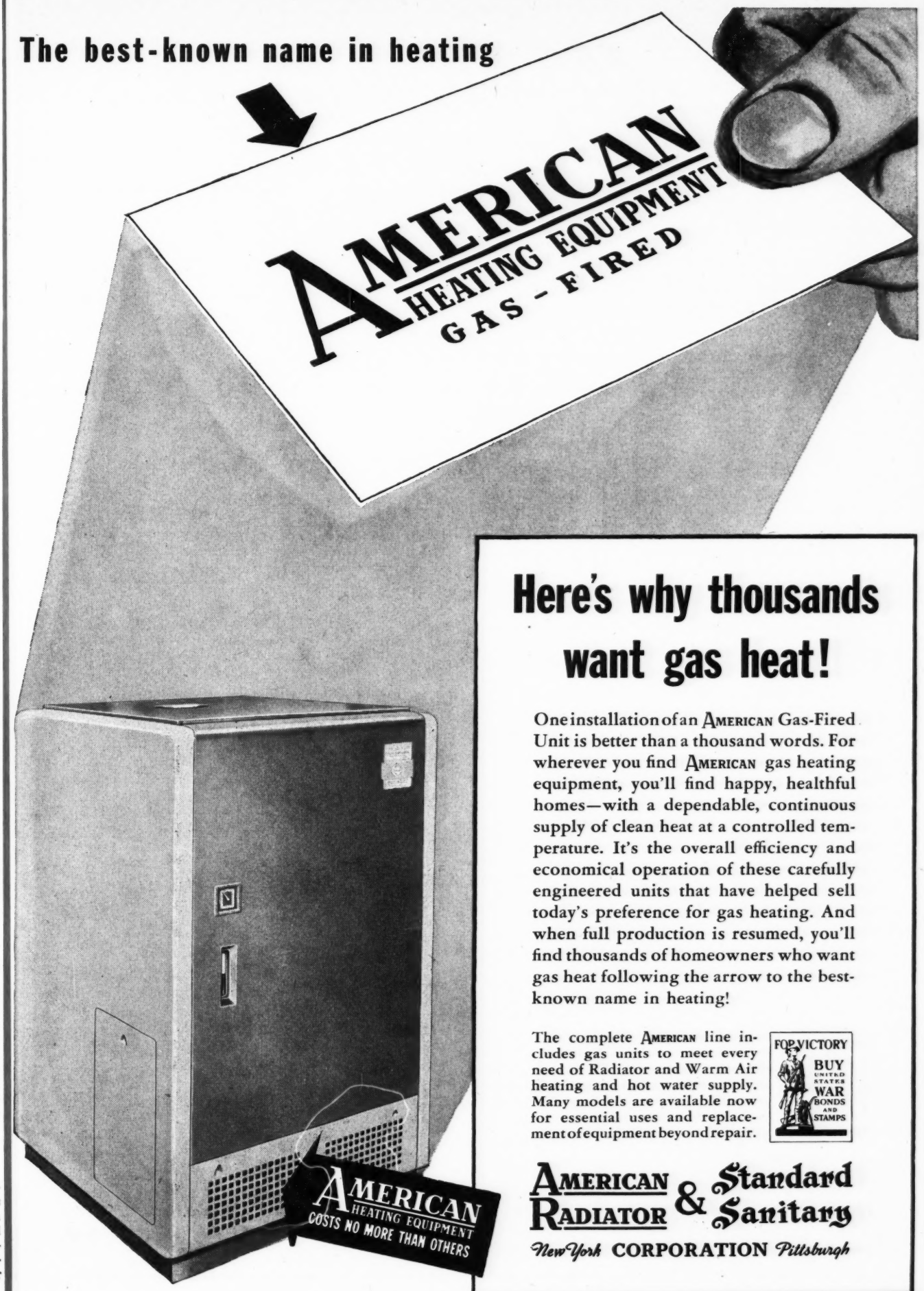
San Diego Rates Cut

A rate reduction by the San Diego Gas & Electric Co., San Diego, Calif., which went into effect on Feb. 1, 1945, has resulted in a savings of over $161,000 in gas rates by consumers. The 3% reduction is applicable to all except surplus industrial gas and minimum bill customers and will remain effective for 12 months. Benefits to gas users will range from a dollar or more annually to larger amounts, depending on volume of consumption.

SGA Re-elects Officers

The Southern Gas Association renamed Frank S. Kelly, Shreveport, as president of the organization. Clayton L. Nairne, New Orleans, was re-elected vice president. C. L. Trevitt, merchandise manager for Lone Star Gas Company, Dallas, was elected a member of the board of directors.

The best-known name in heating



Here's why thousands want gas heat!

One installation of an AMERICAN Gas-Fired Unit is better than a thousand words. For wherever you find AMERICAN gas heating equipment, you'll find happy, healthful homes—with a dependable, continuous supply of clean heat at a controlled temperature. It's the overall efficiency and economical operation of these carefully engineered units that have helped sell today's preference for gas heating. And when full production is resumed, you'll find thousands of homeowners who want gas heat following the arrow to the best-known name in heating!

The complete AMERICAN line includes gas units to meet every need of Radiator and Warm Air heating and hot water supply. Many models are available now for essential uses and replacement of equipment beyond repair.

AMERICAN RADIATOR & Standard Sanitary
New York CORPORATION Pittsburgh

Highlights

***Appointed:** D. A. HULCY, president, Lone Star Gas Co., to the chairmanship of A.G.A.'s newly created Promotional Committee; GEORGE A. McDONALD, for the past eight years public utility and railroad editor for the New York Sun, as director of publicity for the American Gas Association. He will have charge of general publicty in coordination with the expanded program of research, advertising, and promotion (see page 44).*

•

Panhandle Eastern Pipe Line President E. Buddrus, also president of the Independent Natural Gas Association of America, is conducting a survey to determine the number of individuals and companies involved in the production and marketing of natural gas.

•

Last month state commissions in New York, Montana, and Arkansas, according to press reports, challenged the Federal Power Commission's invasion of purely state matters. Said Attorney General Guy E. Williams of Arkansas, in announcing that he would use his full authority to aid the State Utilities commission against the federal bureau, "The time has come to determine whether or not state's rights are to prevail. Our forefathers fought one war over state's rights, and it looks like another is brewing."

•

The "electrical home," according to the *Wall Street Journal*, will be the thing in TVA territory. No postwar dream, this trend will merely be the resumption of one established by the building of 1000 small homes built in the area just prior to the war. Electric heating is possible there because of (1) kwh costs of 1.88 cents as compared to the national average of 3.55; (2) warmer winters.

•

***Postponed:** Until late summer or early fall, FPC's first hearing in the natural gas investigation originally scheduled for Kansas City, May 1.*

The American Gas Association's Regional Spring Executive Conferences until further notice because of the current war situation and critical travel conditions.

•

Recently the National Housing Agency surveyed 918 families living in dwellings scattered across the country. Findings were: People wanted more windows, closets, storage space, better lighting and washable walls. Complaints were made about poor plumbing, drafts, tiny rooms. They seemed to be satisfied with the general plan of present-day houses, with heating facilities and modern kitchen equipment.

•

The Coming Building Boom: One business service in March estimated new home construction at from one to 1¼ million units annually for the decade following removal of restrictions. This exceeds substantially the 900,000 units built in 1925, the peak prewar year; represents a huge increase over the annual average of 347,000 for the 10-year period ending in 1941. Easing of restrictions is expected soon after V-E day. First impetus will come from deferred maintenance and modernization, the real boom not to hit full swing until a year or so after Germany collapses.

While the accumulated housing shortage due to the war is a principal contributing factor, it is pointed out that home construction since 1928 has failed to keep pace with population growth and fire losses, which normally require 450,000 units annually.

Costs, up 30% since 1939, will likely go higher as the boom develops. The trade predicts that 5-10% of postwar housing will be of the low-cost prefabricated type, chiefly in centralized areas. There will be a marked increase in precut lumber and millwork, standardized unit installations, including kitchen fixtures.

•

***Died:** ALEXANDER B. MACBETH, 71, onetime (1926) president of the American Gas Association; retired president, Southern California Gas Co. (1927-1939) on March 20 in Los Angeles.*

•

Good Housekeeping's latest consumer panel on kitchen ranges brought out the following most-mentioned suggestions for improvements: automatic time control, glass panel on oven door, deep-well cooker, reminder clock, larger oven, automatic heat control for oven, and simmer type burners.

•

Increased military requiremenets for steel caused OWU on March 28 to issue Direction 4 to Utilities Order U-1, placing emergency restrictions on purchases by all users during the second quarter for maintenance, repair, operating supplies, and minor plant additions.

•

California in 1944 was again the top natural gas consuming state with a send-out 2% above that of Texas. California led also in natural gas consumers with 2.1 million (one-fifth the U.S. total); Ohio was second with 1.4 million; Texas third with 750,000.

Industrial consumption in California ran to about 40% with an average cost per Mcf of 16¢ as against 75% in Texas with an 11½¢ per Mcf average cost.

Aggregate gross revenues in California in 1944 rose 13.3%, biggest gain for any state area, although volume increase in consumption was 12% less than in Texas due to use there of cheap gas for wartime industry.

Pre-sell the New Freedom Gas Kitchen

...WITH THIS NEW ROPER PLAN
Start thinking and planning now!
A New ROPER GAS RANGE
COMPANY SIGNATURE
A Peek into THE AMAZING NEW WORLD OF TOMORROW
"PEEK INTO TOMORROW" BOOKLET
SIX ATTRACTIVE NEWSPAPER ADS
ROPER presents new ideas
NEW IDEAS for TOMORROW'S KITCHENS...
new for tomorrow's kitchens
SIX COLORFUL CONSUMER FOLDERS

Right now "Beautiful New Gas Kitchen" is number one on the post-war buying list of many an American housewife. Further intensifying this interest is current advertising of the A. G. A. and Roper in women's magazines with large circulation.

Effective promotion at the point-of-sale is needed to crystallize public desire into post-war action that will mean more sales for you. Write for the complete Roper plan for promoting gas kitchens in your community.

GEO. D. ROPER CORPORATION, Rockford, Illinois, manufacturer of ROPER, *"America's Finest Gas Range"* for all gases including L.P. (Liquefied Petroleum) gas.

Offices and Warehouses in Atlanta - Chicago - Cleveland - Dallas - Denver - Los Angeles - Oakland - Philadelphia

ROPER GAS RANGES

McCall Home Service Contest to Close July 1

ENTRIES for the fifth consecutive *McCall Magazine* contest, covering the period of June 1, 1944 to May 31, 1945, should be filed not later than midnight of July 1, 1945. Cash prizes with plaques or certificates, ranging from: First prize—a plaque and $150 in war bonds, and stamps or cash, to Fifth prize—$25 in a war bond and stamps or cash and a framed illuminated parchment, will be made to the five home service directors or directing heads of home service departments of those gas companies in the United States and Canada which have, in the judgment of the Jury of Awards, submitted papers which indicate outstanding contributions to the war effort.

The entrants will submit three copies of a report of 2000 words or less (with one copy of any appropriate photographs or illustrative material pertaining to the results if desired) covering the following four classifications, to which the indicated weighted merit rating will be given by the judges:

1. The planned 1944-45 Wartime Program of the Home Service Department. (25 points.)
2. Activities to further better living through care and use of gas household equipment; to further Government nutrition and food programs; other activities to maintain good-will. (15 points.)
3. The actual progress made in accomplishment of these objectives in the period of June 1, 1944 to May 31, 1945. (50 points.)
4. Summary of accomplishments of the average Home Service worker in this period (this summary shall be arrived at by dividing the total accomplishment of the department in each activity by the average number of workers). (10 points.)

The combined ratings are designed to place large and small gas utility home service departments on an equal footing, in competition.

In order to guide the judges, each report shall have a foreword giving the following information:

1. Total number of residential customers December 31, 1944.
2. Brief description of territory served—concentrated area or scattered with preponderance of small communities.
3. Number of company offices from which the activities were carried on.

Entries should be addressed to McCalls Magazine Awards, c/o American Gas Association, 420 Lexington Avenue, New York 17. Presentation of the awards will be made in October, 1945.

A Stacey-Klonne Dry Seal Holder located in Michigan. Capacity 10,000,000 cu. ft.

ADVANTAGES— *worth your consideration*

The Stacey-Klonne Dry Seal Gas Holder is the most economical to operate and maintain because:

1. Dry mechanical seal eliminates the constant repair and maintenance problems connected with liquid seals.
2. There are no tank draining and refilling problems or expense.
3. Elimination of water tank means simplified foundation problems and requirements.

Write for complete information

The STACEY BROS. GAS CONSTRUCTION CO.
One of the Dresser Industries
5535 Vine St. Cincinnati 16, Ohio

DRY SEAL GAS HOLDERS

Stacey Brothers ENGINEERS • FABRICATORS ERECTORS • RECOGNIZED EXPERIENCE & FACILITIES

FPC Postpones Natural Gas Investigation Hearings

The Federal Power Commission March 25 postponed until late summer or early autumn, the series of hearings in the principal natural gas producing regions of the country scheduled to begin on May 1 in Kansas City, Mo., pursuant to the Commission's nationwide investigation of the conservation and utilization of natural gas (see p. 9).

The Commission adopted the order after being advised by representatives of the conservation authorities of Kansas, Louisiana, and New Mexico, which are in course of preparing evidence on natural gas reserves, conservation practices, gas utilization and related matters for presentation at the hearings, that the postponement is desirable in order to afford adequate time for the presentation of such evidence.

Odessa Carbon Black Plant Planned by United Carbon

Plans for construction of a $1,423,000 carbon black plant at Odessa, Texas, under the emergency synthetic rubber program has come up for action by the Defense Plant Corporation Board. The plant would be built and operated by the United Carbon Co., Inc., for the DPC. The spokesman for the government agency said the new plant, to manufacture "easy-type channel" carbon black, may be operated as a part of, or in conjunction with, a new $600,000 installation of United Carbon in the Midland-Odessa area.

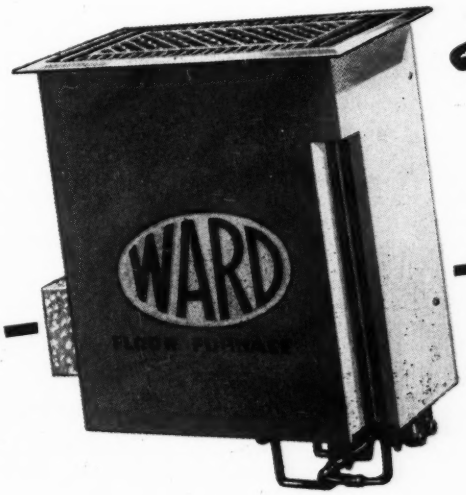
WARD

You'll sell 36 YEARS OF FLOOR FURNACE EXPERIENCE when you sell the WARD...

The postwar Ward Floor Furnace will not be an untried article. It will be backed by over a third of a century of experience in manufacturing floor furnaces. This "postwar" idea was new in 1909. Today, thousands of home owners know the joys of better heating with a Ward. Tomorrow's market will offer bigger sales possibilities than ever before. Remember, there is no substitute for experience!

WARD HEATER COMPANY

1800 WEST WASHINGTON BOULEVARD • LOS ANGELES 7, CALIFORNIA

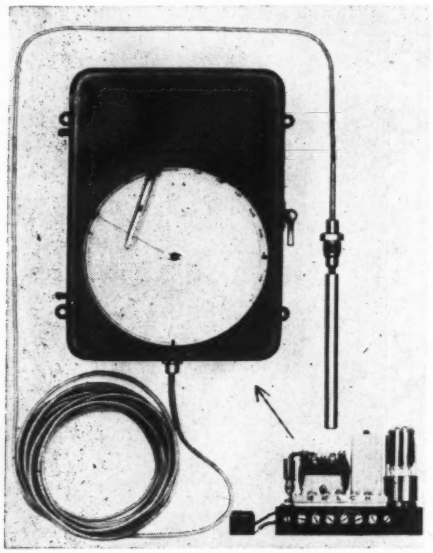


36 years of "KNOW-HOW"

NEW PRODUCTS

Electronic Controller

The Bristol Co., Waterbury 1, Conn.
Model: Free-Lance Electronic Controller.
Application: To control temperature in electric, oil, gas fired and steam-heated ovens, dryers, dehydrators, oil baths, smoke houses, tanks, and other similar industrial apparatus.
Description: Operates on the shielding effect of a vane passing between two coils in an electronic circuit. Recording and indicating models are offered for automatic control of temperature, pressure, liquid level, and humidity.



The following types of control operation are available: low-open, high-open, low-high, low-open high, and low-normal high. It is offered in ranges from —125° F. to +1000° F., is available in ranges from full vacuum to 6000 psi, and in addition is available for automatically controlling liquid level. The humidity controller operates from a wet and dry bulb type of element with separate control for each bulb. The controller is also offered as a time-program controller for automatically controlling temperature, pressure, liquid level or humidity according to a definite time schedule.

Bend Testing Machine

The Air Reduction Sales Co., 60 East 42nd St., New York 17.
Model: Portable Tensile and Guided Bend Testing Machine.
Application: Performs three weld tests —(1) reduced section transverse tension test; (2) guided bend test (a complete 180° face or root bend); (3) longitudinal all-weld metal tension test (0.505 in.)
Description: The machine operates on the principle of the hydraulic jack and a hand operated pump transmits pressure through a hose to the plunger. While the maximum direct load is 40,000 lbs., the use of reduced section specimens permits tests on metals of 150,000 psi or higher tensile strength. Booklet ADI-889 further describing this machine may be obtained upon request to the Air Reduction Sales Co., above address, or any local Airco office.

Heating Torch

Air Reduction Sales Co., 60 East 42nd St., New York 17.
Model: Heating Torch with Multi-Flame Tips (Style 9802).
Application: Designed for concentrated localized heating such as is required for bending, straightening and shrinking of steel plate as well as for silver-brazing of heavy copper plate in the manufacture of copper pipe.
Description: The torch is lighter in weight than heating torches available in the past, yet has equal gas capacity. Five new multi-flame acetylene heating tips as well as two multi-flame propane heating tips are available for this torch. These seven tips will meet the requirements of every heavy heating job. For further information, write to the manufacturer.

Slide Rule

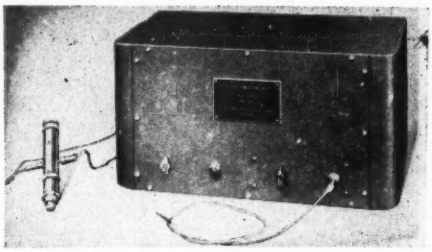
Charles Bruning Co., Inc., New York and Chicago.
Model: No. 2401 5-in. Pocket Slide Rule.
Application: A precision instrument designed for fast, easy operation, adapted to the widest possible range of service.
Description: A feature of the slide rule is the precision of its graduations, which, being molded in, are an integral part of the rule and will not lose visibility through use. Graduations and numerals of the CI scale are in red to facilitate reading. Three screws in the back provide a simple adjustment for tension on the slide. The indicator is of glass, easily replaceable in the event of breakage and is enclosed in a frame of stainless steel that eliminates "wobble". A, B, CI, C, D, K, S, L and T scales are shown on the rule. Cost: $4.00.

Pressuregraph

Electro Products Laboratories, 549 W. Randolph Street, Chicago.
Model: Pressuregraph.
Application: Linear Pressure-time curve indicator.
Description: It is claimed by the manufacturer that this new electronic device will indicate, in linear response on the screen of a cathode ray oscillograph, the pressure-time curve of any internal combustion engine, pump, airline, or any other enclosed pressure system where pressure measurements are desired. The Pressuregraph measures either static or dynamic pressures. It is stated to have been successfully applied to 2-cycle engines to show pressure-time-curve of main cylinder or crankcase and also to have been used on C. F. R. aviation fuel test engines for measurement of pressure-time-curve.

In operation, the pickup section of Pressuregraph is inserted in the cylinder, chamber or airline, etc., to be pressure measured. The pickup response is transmitted, after amplification, to the screen of a cathode ray oscilograph.

Additional advantages claimed for



the Pressuregraph are simplified operation, only one control being required, with one initial adjustment to compensate for temperature effects.

Price of the Pressuregraph, including electronic pickup, is $600.00. The cathode ray oscillograph will be supplied at additional cost. Deliveries are being made on priorities of AA3 or better.

Catalogs

• **The Askania Regulator Co.,** 16th and Michigan Avenue, Chicago 16, Ill., has published bulletin No. 101 on Ratio Control. It points out the manner in which Askania Ratio Control may be applied to many types of proportioning applications in the process industries.

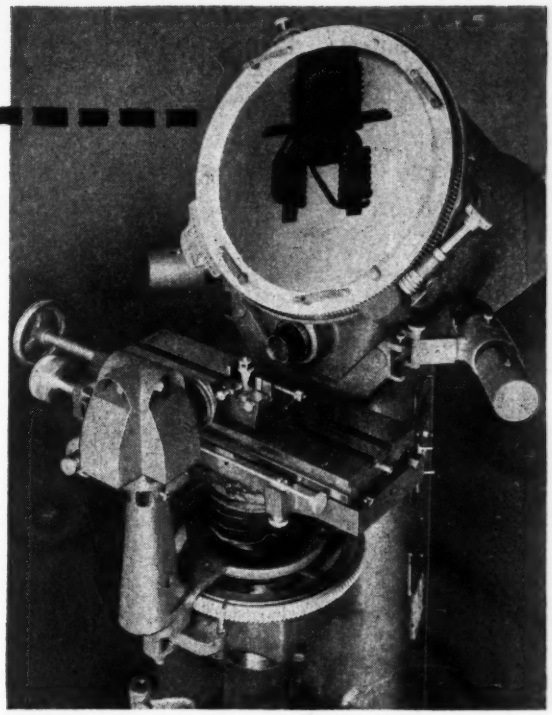
A feature of the bulletin is the orifice calculation chart. This offers engineers a quick method of orifice size determination for air and gas flow.

• **Bridgeport Brass Co.,** Bridgeport, Conn., has published a new technical bulletin on the applications and installation of Duplex Tubing. The tubing was developed to overcome corrosion problems too severe for a single metal or alloy. By treating the condition as two separate corrosion problems and selecting the material best for each, it is possible to combine two materials into one tube.

• **Armstrong Cork Co.'s.,** Building Material Division, Lancaster, Pa. has published a new booklet on "Insulating Fire Brick", which describes five types of fire brick for temperatures up to 2600° F, and features new data on suspended arches and walls and tailor-made arches and domes. Photographs and sketches illustrate the text. "Diatomaceous Earth and Insulating Concrete" and "Ingot Mold Insulation" are also described in the booklet.

• **Dresser Manufacturing Co.,** Bradford, Penn., has issued a folder to serve as a combination catalog direct mail piece in reintroducing their Style 85 Bellmaster Joint for cast-iron pipe.

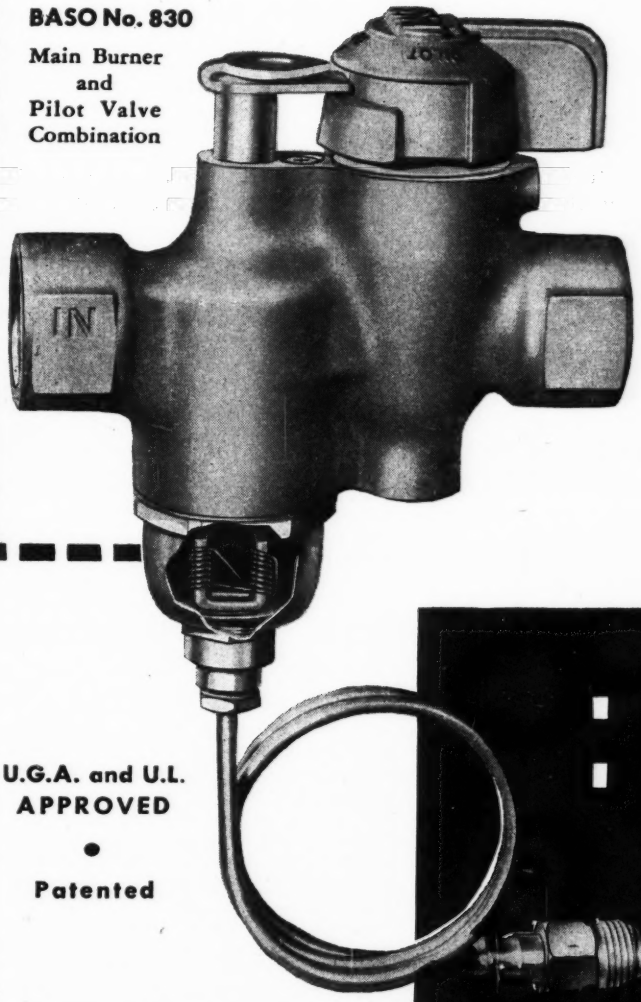
• **Niagara Blower Co.,** 6 East 45th St., New York 17, has issued Bulletin 98, which includes colored operating drawing of the "Niagara Aero After Cooler."



MAGNIFIED 100 TIMES...FOR PRECISION
The "Comparator" shows the slightest variation from tolerance.

QUALITY ...by Control

BASO No. 830
Main Burner and Pilot Valve Combination



Greater precision...with every step of production under closest control...gives the Baso Automatic Pilot its *high quality* standard.

It is our endeavor that with *Baso* there will be no failures that the scientific accuracy of precision instruments and machinery, or that painstaking engineering skill can prevent. It's this unseen quality that assures Baso's positive performance.

Models for all types of gas-burning appliances

U.G.A. and U.L. APPROVED

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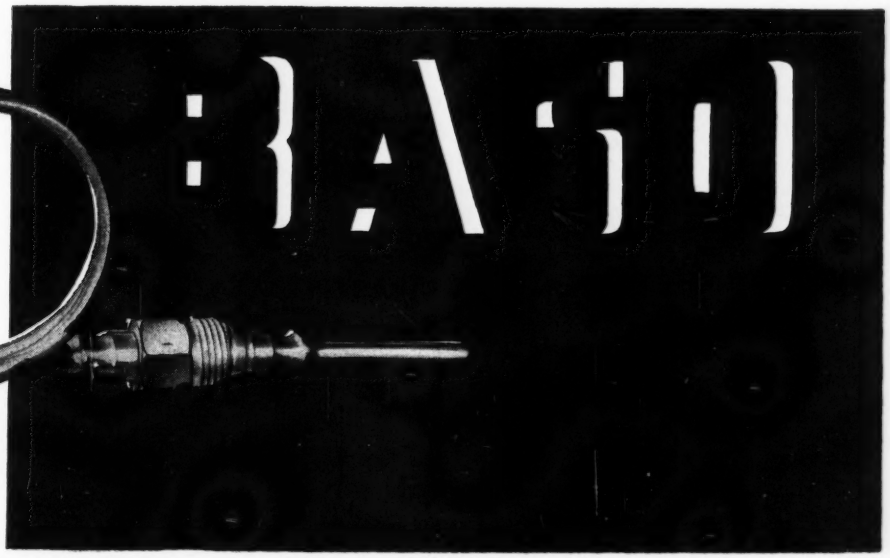
Patented



■ "The Application of BASOS" —our Catalog and Bulletin No. S-300 available on request.

MILWAUKEE GAS SPECIALTY CO., MILWAUKEE 3, WIS.

PIPELINE NEWS

• FPC will hold a public hearing beginning May 15, on applications filed by Panhandle Eastern Pipe Line Co. for (1) authority to export natural gas from the United States to Canada, and (2) a certificate of public convenience and necessity for authority to construct and operate additional facilities for the transportation and sale of natural gas in interstate and foreign commerce.

Under a 20-year contract with the Union Gas Co. of Canada, Ltd., Panhandle proposes to sell and deliver to the Canadian company 5,500,000 Mcf of natural gas during the spring, summer, and fall months of each year during the contract period.

Panhandle proposes to construct a 16-in. pipeline connecting with its main 22-in. transmission line at its Detroit regulator station in Allen Park, Mich. and extending to River Rouge, Mich. and from there to the west bank of the Detroit River. Also proposed are two parallel 12¾-in. pipelines connecting with the 16-in. line to cross the Detroit River. A pressure-reducing station, and a measuring station between its existing 22-in. line and the proposed 16-in. line are also included in the construction proposed.

NO COMPUTATION NECESSARY
Readings, accurate to the second decimal, are read *directly* from the chart. Readings to the third decimal can be made by easy approximation.
ARCCO-ANUBIS GAS GRAVITOMETERS
Once calibrated and properly installed, the Arcco-Anubis Gas Gravitometer requires no further attention. The unit is practically frictionless. No electric motors, pressure regulating valves or other complex equipment to get out of order. The gas flow is continuous, thus the most minute changes in specific gravity are recorded the instant they occur.
Arcco-Anubis Gas Gravitometers have proved themselves by giving accurate readings under the most adverse working conditions. Hundreds are in continuous use, in pipe lines and refineries of major companies all over the country.
SEND FOR BULLETIN NO. 101
AMERICAN
RECORDING CHART CO.
3113 E. 11th St. Los Angeles 23, Calif.
SEND FOR COMPLETE LIST OF ARCCO CHARTS

• The Federal Power Commission has received an application filed by **Metropolitan Eastern Corp.**, a new corporation organized under the laws of Delaware, with principal offices in Wilmington, Del., and a New York branch office at 50 Church St., for a certificate of public convenience and necessity to construct and operate 825 miles of 18-in. natural gas pipeline extending from the east Texas gas fields to Ohio. The project would include five compressor stations totaling 25,600 horsepower and have an initial daily capacity of 140 million cu. ft. of gas. Total cost is estimated at $23,500,000.

The company was organized, the application says, with the present sole intent to construct and operate this particular line. It is proposed to start construction during April, 1945 and complete it on or before October 31 of this year.

• In line with WPB's request for greater gas deliveries to the Appalachian area, particularly next winter, **Tennessee Gas and Transmission Co.**, Houston proposes to construct and operate 95 miles of 16-in. line from San Salvador field in Texas to connect with its main line completed last November. The company also proposes to operate under lease from DPC four additional compressor stations. The facilities would increase daily deliveries by 60 million cu. ft. Hearing before the FPC was scheduled for March 21.

• WPB has granted top priority to **United Gas Pipe Line Co.** for the construction of a 142-mile, 24-in. gas transmission pipeline from the Carthage gas field to the company's Sterlington compressor station near Monroe, La., R. H. Hargrove, vice president and general manager of the company, announced recently. The line will transport about 170 million cu. ft. daily. Construction will start upon receipt of FPC approval (hearing set for March 26) and is scheduled for completion by Sept. 1. Cost is estimated at $7,000,000.

Purpose of the line is two-fold: (1) To deliver 100 million cu. ft. of gas at Monroe into the **Tennessee Gas and Transmission Co.** system, which in turn will deliver the gas to fuel shortage areas in the Appalachian area, and (2) to supplement with the remaining 70-million cu. ft. daily United reserves in the Monroe field.

The line will be designed to operate at pressures up to 1000 psi gauge. However, the company proposes initially to operate the line at an inlet pressure of 700 psi gauge at Carthage and 500 psi gauge discharge pressure at Sterlington.

Construction plans call for two measuring stations at the Carthage end of the line, and two in the Monroe area. A telephone line and facilities approximately 140 miles long will also be built, paralleling the pipeline and interconnecting with the company's communication system. Three river crossings are involved, one being the Sabine River at a point approximately eight miles east of Carthage, one the Red River near East Point, and the other at a point approximately nine miles north of Monroe.

The Tennessee company has estimated the gas reserves available to it in the Carthage field at one and one-quarter

trillion cu. ft., with an expected life in excess of 20 years. Estimated reserves presently available to United in Carthage field total approximately one trillion cu. ft., and it is anticipated that additional gas reserves will be made available to United as other producers market their gas through the proposed facilities.

• **American Light and Traction Co.,** holding company controlling Michigan Consolidated Gas Co. of Detroit, has applied to FPC for a certificate to construct and operate a 1085-mile, 26- and 22-in. gas line from Hugoton gas field near Guymon, Okla. to points near Detroit and Toledo. From Detroit the line will extend about 140 miles to the Austin gas storage field in Mecosta County, Mich. Daily capacity, 145,000,000 cu. ft. Cost, estimated at $51,500,000. Construction to start not later than May 1, to be completed, Dec. 31, 1945. For first five years line would supply (a) Ohio Fuel Gas Co. 125,000,000 cu. ft. daily; (b) Michigan Consolidated Gas Co. all requirements above amounts to be furnished by Panhandle Eastern under existing contracts. Expected rates, based on present costs 22½¢ per Mcf.

The pipeline, according to the applicant, has been designed to afford the greatest possible relief to the natural gas shortage in the Appalachian area, as well as to provide continued adequate service for the war industries and communities in Michigan.

During the war period, the line will be able to deliver to Ohio approximately 295 million cu. ft. per day for short periods. This can be accomplished by the use of the Austin storage field, which, with the 5000 hp. compressing station contemplated in the plan, will be able to deliver 200 million cu. ft. per day into the 26-in. line to Detroit, of which some 150 million cu. ft. will be available for Ohio, through the 22-in. connecting line. In addition to this 150 million cu. ft., the pipeline from Guymon can deliver 145 million cu. ft., making a total of 295 million cu. ft. which can be delivered into Ohio for meeting emergency requirements.

American Light & Traction proposes to organize a wholly owned corporate subsidiary under the laws of Delaware, with the name of Michigan-Wisconsin Natural Gas Pipe Line Co., to construct, own and operate the pipeline for which a certificate is requested. The applicant proposes to provide Michigan-Wisconsin with $20,000,000 of equity capital, taking common capital stock at par therefor. Michigan-Wisconsin will market $30,000,000 of first mortgage 3½% bonds and $1,500,000 of 3½% serial notes, the application states.

Survey Indicates Demand For CP Gas Range

The "CP" seal on the gas range is going to be one of the most practical buying guides that women are going to have after the war, according to Elizabeth Bothwell, Food and Household Editor of the Fawcett publications.

Miss Bothwell arrived at this conclusion by conducting a survey for **True Confessions** magazine.

Among the readers surveyed 72.4% were married, 59% had one or more children, 68% do all or some of their own baking, and 52.9% do home canning. In spite of the fact that many children take lunches to school and most husbands eat lunch downtown, 43.9% of the women cook three meals a day.

These figures, state Miss Bothwell, prove that home-makers are going to want and demand the most modern gas ranges and other appliances. The only question in these women's minds is how are they going to be sure they are going to get the greatest convenience and finest performance from the appliances they expect to buy. Established brand names and the "CP" seal are the guarantee of quality that the gas industry offers.

Houston Natural Opens New Office in Falfurrias

The rapid rate of growth and development in Falfurrias, Texas, has led to the opening of new office quarters in that community by the Houston Natural Gas System.

The new office was opened in January and is temporarily located in the Chamber of Commerce Bldg., and will remain there until permanent quarters in the new R. N. Smith theater building (now under construction) are ready. The company's local accounts have more than doubled in the past seven years, according to Frank C. Johnson, district manager.

GAS LEAKAGE CUT 91 PER CENT

•

You get Results with CARBOSEAL anti-leak

A 1,700-foot section of a 4-in. main with cement joints carrying dry manufactured gas showed a leakage of 114 cu. ft. per hour before treatment. After treatment with Carboseal anti-leak, the leakage was cut to 10 cu. ft. per hour, a reduction of approximately 91 per cent.

This is one example of the results obtained in more than 6,500 *miles* of gas mains treated with Carboseal.

To get more information write for booklet, "Correcting Leakage in Gas Distribution Systems with Carboseal Anti-Leak."

CARBIDE AND CARBON CHEMICALS CORPORATION

Unit of Union Carbide and Carbon Corporation

30 East 42nd Street UCC **New York 17, N. Y.**

"Carboseal" is a registered trade-mark of Carbide and Carbon Chemicals Corporation.

CARBOSEAL *Anti-leak*

1300 Gas Executives start full, industry-wide

wheels turning to help assure employment after the war

Utilities from coast to coast register in Servel's Salesman Selection Training Clinics

The Salesman Selection and Training Program, developed by Servel, Inc., and sponsored by the A. G. A., was introduced to the Gas Industry at 10 key-city meetings only a short time ago. But already it is in full gear—thanks to the 1300 company officials, sales managers and supervisors who attended these meetings. Impressed by the completeness of the program, a large number immediately signed up their companies for the second part of the program—The Salesman Selection Training Clinic. Today, more than 100 Gas Companies, representing over nine million domestic meters, have already registered.

Preparing for New Product Opportunities

By entering into this program, these key companies are preparing now to assure full post-war employment in the Gas Industry. More than that, they are arming for the coming "battle of the fuels." They are getting ready to take advantage of the new products which Gas Appliance Manufacturers will provide after the war. Already, many new and better appliance designs have been approved for production. Test models of others are rapidly being developed.

But new and improved products cannot do the job alone. Gas Companies must be *ready* to sell and merchandise these products to the public. They must be *ready* to get the jump on competition. This will call for a tremendous sales effort and will require a competent staff of trained salesmen.

Selection Program Builds Sound Sales Force

The Salesman Selection Program is designed to help sales managers build up their forces to the strength required for this huge sales effort. To train sales managers in the use of this program, a series of two-day clinics will be started within the next few weeks. Sales managers attending these training clinics will not only receive the tools to help select the best available salesmen, but also will acquire the knowledge to effectively put these tools to work. For each sales manager will have the chance to try out what he learns—right at the session—by interviewing typical applicants.

SIGN UP NOW

Registrations for these clinics should be addressed to R. E. Williams, Chairman, Committee on Selection and Training of Domestic Sales Personnel, American Gas Association, 420 Lexington Ave., New York City. Or write to any regional office of Servel, Inc.

FLASH NEWS OF YOUR ASSOCIATION

Conferences held by Sections and Committees during recent months have covered a wide range of topics, from subjects associated with the war effort to postwar planning.* Purchasing and Stores, Personnel Problems, Accounting and Gas Distribution are among recent topics discussed.

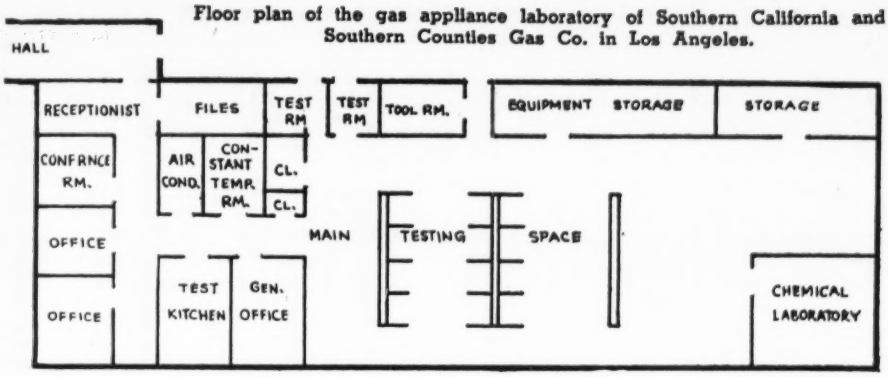
The Sales Section has been particularly active, with meetings devoted to the various Councils — Commercial Cooking, Gas Heating, Ranges and Refrigerators, Water Heaters—and Home Service. Several Technical Section meetings are scheduled.

While the entire Gas Industry made record gains during 1944, the Pacific West's percentage of increase exceeded the national average. Total gas customers in P.C.G.A. territory gained 2.9 per cent, while gas sales were up 10.8 per cent over 1933.

The Gas Flame "quints", featured in P.C.G.A. regional consumer advertising, have achieved national renown! Inquiries have been received from eastern utilities interested in use of the idea.

Watch This Column Monthly

THE WEST PREFERS GAS



Floor plan of the gas appliance laboratory of Southern California and Southern Counties Gas Co. in Los Angeles.

New Southern California Appliance Laboratory

MORE than 100 manufacturers and gas utility people inspected the new gas appliance laboratory of the Southern California and Southern Counties Gas Companies, at an open house held March 19 at the companies' 1700 South Santa Fe Avenue building in Los Angeles, according to Guy Corfield, research engineer of Southern California Gas Co.

The new laboratory, under the direct supervision of H. L. Warren, has complete facilities for the testing and development of gas appliances. It will supplement, rather than duplicate, the work carried on by the American Gas Association Testing Laboratories. In addition it will provide operating information for the two companies as may be required by the sales, service and other departments, and attempt development work in gas utilization.

The Southern California and Southern Counties Gas Companies have maintained an appliance laboratory, under the over-all direction of Corfield, for a period of nine years. Its present staff is 10 employees, for the most part technical and home economics graduates.

General layout of the laboratory is given in the floor plan shown herewith. It covers a floor area of approximately 9000 sq. ft. The main testing space provides individual booths for the accommodation of appliances under test, each booth supplied with gas and electric outlets. The test manifold, shown at the right hand side of the main testing space, is for large appliances or assemblies and is equipped at one end with water supply, meters, floor drains, etc., for water heater testing.

Kitson Company Wins Army-Navy "E" Award

Officiating at the presentation ceremony, Philadelphia, February 13, left to right—Rear Admiral Wat T. Cluverius, U.S.N. (Ret.); Lieut. Colonel Hayward K. Kelley; John E. Hopkins, Foundry; Edward Loges, Clock dept.; Lieut. Gerald F. Welles, Army; and President Morse DellPlain.

A Powerful Force

To Help You Sell

Postwar Gas Ranges

THE NAME MAGIC CHEF has come to be a *magic name* in gas ranges to millions of Americans. There have been two reasons for this. First, the bedrock quality and advanced features of Magic Chef gas ranges. And second, a consistent and powerful program of Magic Chef advertising.

The advertisement reproduced at the right appears in the April WOMAN'S HOME COMPANION and May GOOD HOUSEKEEPING, and is one of a series designed to whet the appetites of range buyers for postwar Magic Chef gas ranges. It is part of a sustained campaign appearing in leading national magazines. This advertising is a powerful force that is *keeping* Magic Chef a Magic Name—a name you can tie to for greater postwar range sales.

For further information on what Magic Chef can mean to you . . . just drop us a line.

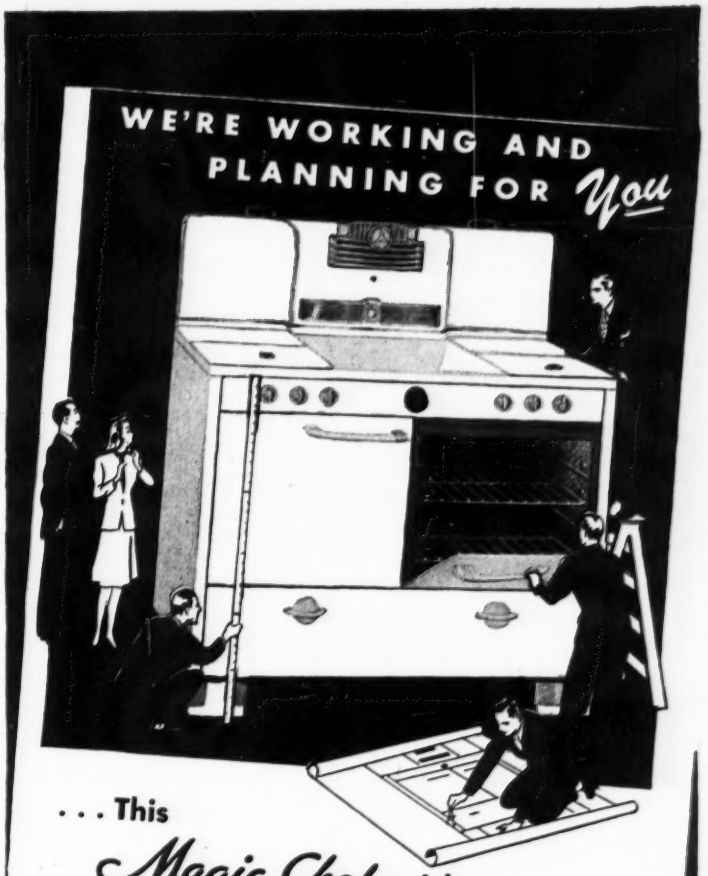
AMERICAN STOVE COMPANY
4901 Perkins Avenue · Cleveland, Ohio
Sales Offices in Principal Cities

Magic Chef

RED WHEEL GAS RANGES
AND HEAVY DUTY GAS COOKING EQUIPMENT

Look for this "CP" Seal on Magic Chef—Trade Mark of AGA and EM.

Awarded to Quick Meal Stove Co. and Geo. M. Clark & Co. Divisions of American Stove Co.



. . . This

Magic Chef with a

Dozen Magic Helps

1 **Automatic Oven Cooking!** Simply set clock and temperature control
2 **Red Wheel Oven Heat Regulator!** Just set regulator—better baking and roasting assured
3 **Automatic Lighting!** All burners light automatically on "CP" Magic Chef
4 **Even Heat**—for better top burner cooking
5 **Swing-Out Broiler**—easy to clean, better broiling results with no smoke
6 **Convenient Work Top**—extra surface for preparing or serving food
7 **Non-Clog Burner**—spilled food can't clog—no messy burner cleaning
8 **Magic Insulation**—full insulation assures cooler kitchens
9 **Cross-Fire Oven Burner**—for better roasting and baking
10 **Easy Cleaning**—all parts designed for cleaning easily—burner trays can be washed like dishes
11 **Porcelain Enamel Finish**—easy to clean—will keep looking new and beautiful
12 Look for "CP" Seal of approval Trade-mark of A G A and E M

Just as soon as conditions permit, we're planning to have ready for you this fine postwar Magic Chef . . . ultra modern in design . . . beautiful . . . thoughtfully planned for your ease and convenience.

It will be the range with a dozen "Magic Helps" to take the work and worry out of cooking. Just wait and see how this Magic Chef takes advantage of gas . . . the *ideal* fuel . . . to give you everything you ever hoped a range could offer!

* * *

If you live beyond the gas mains, postwar Magic Chef ranges will be available for "Pyrofax" Gas in eastern and central states and for other L. P. (bottled and tank) gases elsewhere.

Magic Chef

AMERICAN STOVE COMPANY · Cleveland, Ohio

THE SATURDAY EVENING POST • GOOD HOUSEKEEPING
WOMAN'S HOME COMPANION • ARCHITECTURAL FORUM
PARENTS' MAGAZINE • BETTER HOMES & GARDENS

PEOPLE

• **George S. Tayman** has recently accepted a position with the Federal Power Commission as Natural Gas Engineer in the Division of Rates and Research, Bureau of Accounts and Finance; for the past two years he has been employed as Natural Gas Engineer in the Office of War Utilities, War Production Board. Previous to his coming to Washington in 1943, Tayman was associated with the Union Gas System, Inc., of Independence, Kansas, and one of its predecessor companies, the Owen-Osage Oil and Gas Co., for a period of 22 years. He graduated in Mechanical Engineering at Carnegie Institute of Technology.

G. S. Tayman

• **Walter D. Kline** was recently elected general counsel and a member of the board of directors of Consumers Power Co., Jackson, Mich. He succeeds **Clyde J. Holmes,** whose resignation because of ill health was accepted by the directors, in both capacities

Kline has been with the company's legal department since 1916 and for the past several years had held the title of general attorney. Holmes assisted in handling of the legal work in connection with the organization of the company in 1915 and in 1929 he was elected a vice president of Consumers. He has resigned this position as well as those of general counsel and director.

• **Edwin H. Werner** was recently elected president and a director of Jersey Central Power and Light Co., Asbury Park, N. J., succeeding the late Thomas R. Crumley. Since 1941 Werner has been president and general manager of Pennsylvania Edison Co. Prior to his connection with that company he was vice president and general manager of New Jersey Power and Light Co. from 1933 to 1936 and of Metropolitan Edison Co. from 1933 to 1941. He came to these companies from Reading Street Railway Co. of which he was assistant general manager from 1923 to 1929 and president and general manager from 1929 to 1933.

• The following promotions in the gas department of Public Service Electric and Gas Co., Newark, have been announced by **John A. Clark**, vice president in charge of gas operation:

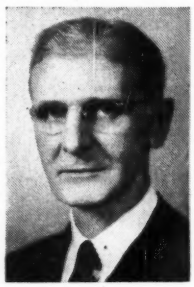
Robert H. Philipps, Jr. from general superintendent of manufacture, to assistant general manager, succeeding the late Charles W. Smythe; **Willian J. Harvey** from assistant general superintendent of manufacture, to general superintendent of manufacture; **J. Arthur Scheller,** from engineer of manufacture, Essex division, to assistant general superintendent of manufacture; **John V. Richards,** from assistant engineer of manufacture, Essex division, to engineer of manufacture.

• **William B. Hewson,** advertising manager of the Brooklyn Union Gas Co., has resigned from membership of the Metropolitan House Heating and Air Conditioning Council. Hewson was chairman of the council in 1943. At the time of his resignation, he was chairman of the postwar planning committee.

Joseph A. Reynolds, retail sales supervisor of the Brooklyn Union Gas Co., was elected to take Hewson's place as one of the company's representatives. **Edward J. Gerridge,** supervisor of house heating and secretary-treasurer of the council, is the other Brooklyn Union representative.

• **Lieut. Col. Kenneth A. Wing,** U. S. Army Reserve, has been appointed veterans' reemployment coordinator for the Philadelphia Co. and Subsidiary Companies, and for the Trustees, Pittsburgh Railway System.

• **George A. McDonald,** for the past eight years public utility and railroad editor for **The New York Sun,** has been appointed director of publicity for the American Gas Association. He will have charge of general publicity in coordination with the expanded program of research, advertising and promotion that has been underwritten by the gas utility companies throughout the country.



G. A. McDonald

McDonald, in addition to his newspaper experience, has a background of 15 years in promotion and publicity work in the food and home furnishings fields. He served as a member of the advisory council that initiated the first advertising and promotion campaign undertaken by the Carpet Institute of America.

He is a charter member of the New York Financial Writers' Association and served as an officer and director of that association from the time of its inception.

• **Louis Charlton,** statistician in the rate department of the Gas Service Co., Kansas City, Mo., has been made new business manager, with headquarters in Carrollton.

• **Hy Byrd,** vice president and treasurer of Panhandle Eastern Pipe Line Co., Kansas City, was elected a member of the board of directors at a recent board meeting of that company.

• **L. T. Potter** has been appointed assistant general superintendent of Lone Star Gas Co., Dallas, in addition to his present responsibilities as superintendent of production, according to an announcement by **Julian L. Foster,** general superintendent and chief engineer for Lone Star.

K. H. Flint

Herbert Luoma

• **Kendall H. Flint** and **Herbert Luoma** of the A.G.A. Testing Laboratories have been promoted to the positions of chief engineer, Industrial Gas Research and chief engineer, Domestic Gas Research respectively, Director **R. M. Conner** has announced. All experimental and development work of the War Products department has been placed under Luoma's supervision.

These promotions place the Laboratories in a position to carry out their part in the newly expanded research program of the American Gas Association.

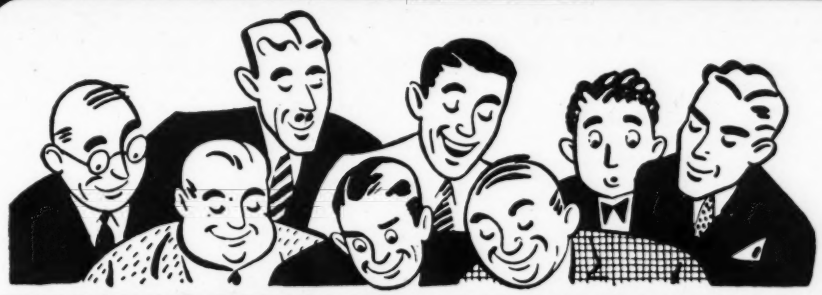
Flint has been associated with the Laboratories for nearly 20 years and has held responsible positions in every phase of their activities. He is a graduate of Amherst College and obtained his master's degree from Massachusetts Institute of Technology in the field of chemistry. All research activities pertaining to industrial gas, air conditioning, approval requirements and mixed gas will be conducted under his supervision.

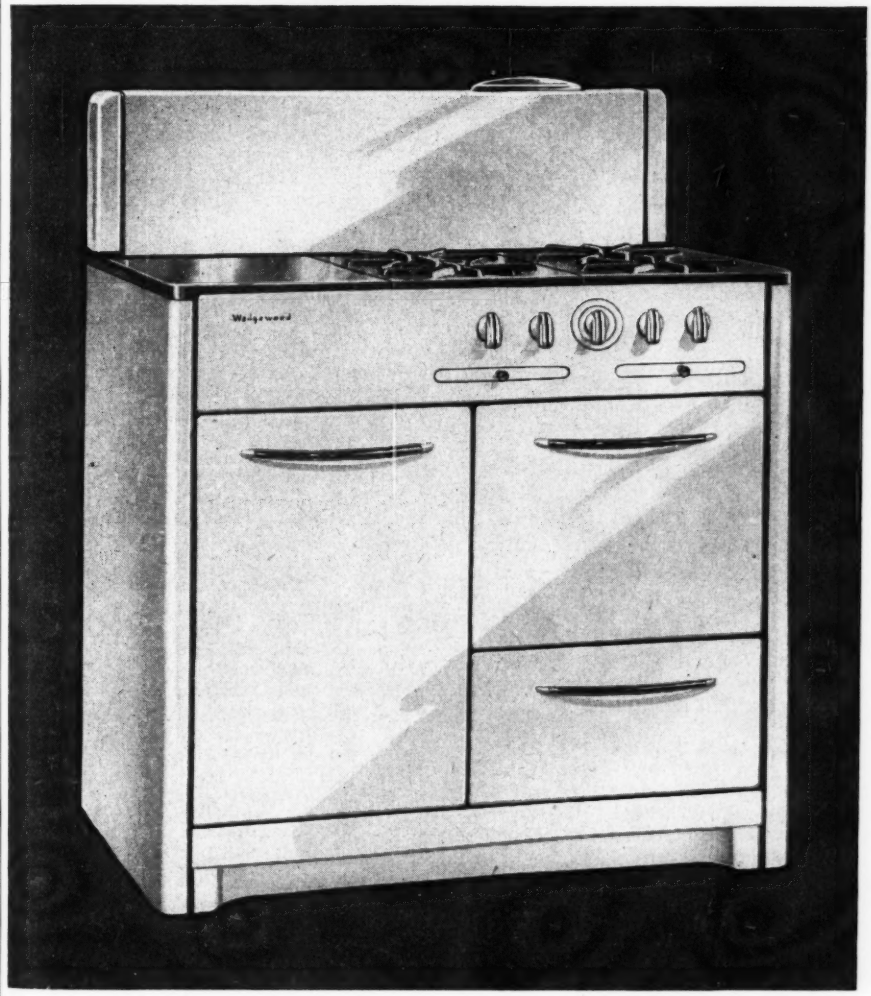
Luoma joined the A.G.A. staff in 1939 following his graduation from the University of Wisconsin as an electrical engineer. He also has been connected with many phases of Laboratories' activities in testing, inspection and research, including three years at the Los Angeles Branch. For the past three years he has played a dominant role in the development of war products for the Army and Navy and the Office of Scientific Research and Development. As assistant chief research engineer he supervised experimental war contracts, a program which resulted in the development of fire control devices and automatic, continuous flow oxygen regulators for transport planes together with a number of other similar accessories.

• The following four promotions in the New York office of the Cities Service Co. have recently been announced by **Alton W. Jones,** president. **Burl S. Watson,** a director of the company since 1940, has been elected a vice president; **Ernest H. Johnston** has been elected treasure of the concern; **Erle G. Christian,** comptroller, has been named secretary of the company; and **Chester E. Weger** will succeed Christian as comptroller.

• Appointment of **Samuel Bryan,** examiner for the Wisconsin Public Service Commission for 20 years, as a member of the commission to succeed **R. W. Peterson,** resigned, was unanimously confirmed Feb. 16 by the state senate. His term will expire in 1951.

Lynn H. Ashley, Hudson, has been chosen chairman of the commission to serve Peterson's unexpired term.





LOOK AT THAT *quality appeal!*

"WEDGEWOOD HAS IT!" ...dealers say

Above all, the name **"WEDGEWOOD"** on a gas range means Quality, the basic policy of the James Graham Mfg. Co. since 1882. For **WEDGEWOOD** meets not only the exacting quality requirements of Western home-makers, but those of nationally-known engineers, designers, home service experts. No wonder, then, that retailers and gas company executives agree "When it comes to Quality appeal—**WEDGEWOOD** has it!"

MODERNS PREFER GAS

WEDGEWOOD'S EFFICIENCY • BEAUTY • DEPENDABILITY

WHETHER it's baking, broiling or top-of-stove cooking, Western women naturally turn to the **WEDGEWOOD** for life-long service, *satisfaction.*

THAT'S WHY dealers know, when they sell the **WEDGEWOOD'S** quality features, they make friends for their store, and friends for Gas, the wonder fuel.

FOR ALL GASES, INCLUDING LP (LIQUEFIED PETROLEUM) GAS

WEDGEWOOD THE MODERN GAS RANGE

JAMES GRAHAM MANUFACTURING CO.

LOS ANGELES ★ SAN FRANCISCO ★ NEWARK, CALIFORNIA ★ PORTLAND, OREGON

Manufacturers

• General Controls Co., Glendale, Calif., announces the appointment of **A. E. Hess** as manager of its Houston branch office. Hess, has had previous engineering experience with The Carrier Corp. and the Johnson Service Co., joining General Controls in the Spring of 1944.

A. E. Hess

As manager of the Houston factory branch, Hess will serve users of automatic controls in the heating, refrigerations, aircraft and industrial fields throughout Southern Texas, Louisiana and Southern Mississippi.

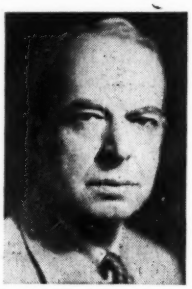
• Three new members have been added to A. O. Smith Corp.'s southwest district sales force, according to an announcement by **J. E. Woodall,** manager of the company's home appliance division. They are: **R. C. Anderson,** sales manager, and **Buster Welch** and **E. E. Edge,** sales representatives of the home appliance division. Their headquarters will be in the company's Houston, Tex. office.

Anderson, a graduate in mechanical engineering of Berry College, has served as sales manager of the Mississippi Power and Light Co., residential and commercial sales manager of the Memphis Power and Light Co., and as sales manager of the United Gas Corp. in Houston.

Welch attended Rice University and Carnegie Tech, then joined the Rudd Mfg. Co. as salesman and climbed to sales supervisor. In 1941 he resigned to enter government work and was mechanical engineer for Headquarters, 8th Service Command, where he was in charge of testing gas systems in New Mexico and Texas.

Edge attended Texas A&M college and has been associated with the Standard Gas and Equipment Co., New York, the Houston Natural Gas Co., operated his own home appliance firm until the war, and since then returned to the Houston Natural Gas Co., as service consultant and department manager of operations for domestic accounts.

• **W. D. Crouch** has been appointed general manager of the commercial and industrial division of the Robertshaw Thermostat Co., according to an announcement by **John A. Robertshaw,** president of company.



W. D. Crouch

Crouch has been associated with the Robertshaw Co. since 1918 and will make his headquarters at the main office in Youngwood, Pa.

Joseph L. Gabris, formerly of the company's St. Louis division, has been appointed district manager with headquarters at 30 Church Street, New York. A graduate of the College of Engineering, and the University of Missouri, he will be in charge of sales of domestic as well as commercial and industrial thermostats in the eastern district.

• **Frederick T. Ketchum** has been appointed sales manager of the Caloric Gas Stove Works, Philadelphia and Topton, Pa. Ketchum is a graduate of Cornell University and comes to Caloric after more than three years of service with the Government as consultant chief of the WPB Purchasing Policy division. He will have the assistance of three divisional managers in setting Caloric postwar policies.

• The addition of two service engineers, **William H. Johnson** and **George L. Geuss,** to Pittsburgh Equitable Co.-Merco Nordstrom Valve Co.'s New York district office, was announced recently by **A. J. Kerr,** general sales manager. These men will handle the sale and service of Pemco and Merco products in sections of the territory under the jurisdiction of **M. J. Harper,** district manager.

Johnson has been connected with the manufacture of water meters and water meter parts for the past 15 years. Geuss has been with the company several years. Prior to joining Pemco-Merco, he conducted his own industrial lighting and equipment business.

• **R. O. Montrief** has been appointed general manager of the Ward Heater Co., with headquarters in Los Angeles, succeeding **R. G. Logue,** who passed away Feb. 22.

R. O. Montrief

Mr. Montrief has been in the employ of the company for over 12 years. His previous position was that of chief engineer. Before joining the Ward organization he was engaged in the production of heating appliances. He is a graduate of Texas A and M where he received a degree as a mechanical engineer.

• The Foxboro Co., Foxboro, Mass., announces that **William A. Rock** will be its resident engineer in the Corpus Christi area, under the direction of the Houston office. Rock's business experience has been principally in the instrumentation of oil refineries and gas plants.

James M. Tuttle has joined the staff of engineers attached to the Pittsburgh office of Foxboro. Tuttle, a graduate of M.I.T. spent several years as an engineer with an industrial construction company, and later conducted his own business as a manufacturers' representative and engineering consultant.

• **Alan P. Tappan,** former first vice-president of the Tappan Stove Co., Mansfield, Ohio, has been promoted from the rank of lieutenant colonel to full colonelcy, according to an announcement in Washington, D. C. Tappan left Mansfield in 1942 when he was commissioned a captain in the procurement division of the army air forces. First stationed at Wright Field, Dayton, he went to England late in 1942 and while there, was commissioned a major. Returning from England, he was promoted to lieutenant colonel in the fall of 1943. With his new commission, he will remain in Washington, in the A.A.F. procurement division.

• **Gordon N. Gray** has been appointed works manager of the St. Clair plant of the Bryant Heater Co., Cleveland, according to announcement by **Lyle C. Harvey,** president. Previous to joining Bryant in 1933, Gray was a research and sales engineer for the U. S. Air Compressor Co.

• Worthington Pump and Machinery Corp. announces the appointment of **George Steven** to the post of executive engineer of its Buffalo Works. **Harold W. Whiting,** formerly Steven's assistant, now succeeds him as chief engineer of Buffalo Works compressor division.

• **W. B. Holton, Jr.,** president of the Walworth Co., manufacturers of valves and fittings, was elected president of the Valve Manufacturers Association, a national organization.

Holton, since March, 1943, had been production consultant and head of the valve and fittings industry group for WPB. He resigned that post Feb. 1.

UTILITY Appliance Corp.

Formerly
UTILITY Fan Corporation

GAS-FIRED HEATING EQUIPMENT

FLOOR FURNACES
FORCED-AIR FURNACES
CENTRIFUGAL BLOWERS
CIRCULATING HEATERS
UNIT HEATERS
PROPELLER FANS

UTILITY

4851 South Alameda
Los Angeles 11

YOUR POSTWAR DOMESTIC GAS MARKET POTENTIAL SALES

When the war ends, what will be the sales market for Domestic Gas appliances? Every Gas appliance manufacturer and dealer knows that potential market will be large. How large, is a matter of speculation.

Our marketing research analyses indicate a reasonable prediction for a sales market of $102,176,720 in Northern and Central California. This figure represents possible sales for seven principal domestic Gas appliances over a six-year period from 1945 to 1950, inclusive. The retail prices of 1941 were used as basic values and favorable sales conditions are assumed. The tabulation below gives this sales market in detail. Costs of installation are excluded.

POTENTIAL DOMESTIC GAS APPLIANCES MARKET 1945-1950, INCLUSIVE IN TERRITORY SERVED BY P. G. and E.

	Number of Units	Average Unit Price	Retail Dollar Value
Ranges	364,844	$138	$ 50,348,472
Automatic Water Heaters	388,471	49	19,035,079
Non-automatic Water Heaters	14,008	15	210,120
Circulators and other room-type Heaters	131,428	33	4,337,124
Floor Furnaces	123,771	50	6,188,550
Central Furnaces	82,305	156	12,839,580
Home Laundry Dryers	63,571	145	9,217,795
Total Gas Appliances			$102,176,720

This is the last of a series of ads devoted to after-the-war merchandising of Domestic Gas Equipment.

P. G. and E. PACIFIC GAS AND ELECTRIC COMPANY

Gas Combustion and Control Equipment

THE
WEBSTER ENGINEERING COMPANY
Tulsa, Oklahoma

Consulting Engineers and Manufacturers

Division of
SURFACE COMBUSTION

TOLEDO, OHIO

WELSBACH
ENGINEERING and MANAGEMENT CORPORATION

All phases of
GAS and ELECTRIC UTILITY

MANAGEMENT
CONSTRUCTION
APPRAISAL

E WELSBACH M

1500 WALNUT ST.
PHILADELPHIA 2, PA.

Obituaries

• **Alexander B. Macbeth,** former president and director of Southern California Gas Co., Los Angeles, died March 20, at the age of 71, after a brief illness. Macbeth had a long career in the gas industry, beginning in 1898 when he became a cadet engineer with the United Gas Improvement Co., Philadelphia, immediately after his graduation from Stevens Institute of Technology. After a two-year gas company service there and at Atlanta, he moved to Kansas City, Mo., where he became assistant superintendent of the Kansas City Gas Co. In 1910, he was made general manager of that company.

A. B. Macbeth

Four years later he accepted the position of vice president and general manager of the Southern California and Midway Gas Companies in Los Angeles. He retained this position until he was made president of Southern California Gas Co., following a consolidation of the two companies in 1927. He retained the presidency and continued in that position until his retirement in 1939.

During his gas industry career, Macbeth served as president of the American Gas Association (1926), the Natural Gas Association (1911) and the Chamber of Mines and Oil (1925).

• **Ben Douglas Balthis,** 47, president, Natural Gas Equipment, Inc., Los Angeles, passed away from a heart attack, March 17 at his home in Glendale, Calif.

A native of Huntsville, Mo., Balthis had lived in Los Angeles for more than 40 years. He was a graduate of Stanford University and a veteran of World War I, Rainbow Division. Balthis joined Natural Gas Equipment at its inception in 1924, as vice president. He was a member of the American Petroleum Institute and the Pacific Coast Gas Association.

• **Philip H. Gadsen,** who retired on Jan. 1, 1942 as senior vice president of The United Gas Improvement Co., of Philadelphia, died Feb. 27, at the age of 77. Gadsen's career as a public utilities executive spanned a period of more than 40 years. He began it in 1900 as vice president of the Consolidated Railways and Lighting Co. of Charleston, S. C. He became vice president of United Gas in 1919.

• **S. A. "Sandy" Macdonald,** 44, Portland Gas & Coke Co., Portland, Ore., appliance dealer coordinator for seven years and a veteran of both world wars, died suddenly at his home March 18. He had received an honorable discharge from the navy last January, returning to the position he held at the time of his enlistment in 1942.

• **William M. Dineen,** 55, former secretary of the Wisconsin Public Service Commission, died at his home in Madison on Jan. 31 of a heart ailment.

Servel News Honored By Industrial Editors Ass'n

For the second time in three years the "Servel News", a magazine published by the advertising and sales promotion department of Servel Inc. was awarded top honors in the annual contest of the Industrial Editors Association.

This association annually honors the 25 top magazines in five different classifications. The "News" shared recognition in the external magazine classification with the "Phoenix Flame" published by the Phoenix Metal Cap Co. and "Telephony" published by the Telephony Publishing Co.

"Servel News" is published under the supervision of R. J. Canniff, advertising and sales promotion manager for Servel, and is edited by William A. Rorison.

Hugoton Field Production Up 71% in 1944

The big three-state Hugoton gas field increased its production by 71.4% during 1944, without taking into consideration the smaller sector lying in Texas from which figures were not available.

The yield from the Oklahoma-Kansas sector was 126,298,533,000 cu. ft., for 1944. A heavy increase of 318% was registered from the Oklahoma sector of the field, centering about Guymon, in Texas county.

Among the big gas producers in the field are the Cities Service Gas Co., Republic Natural Gas Co., Cabot Carbon Co., Phillips Petroleum Co., Southwest Public Service Co., and Skelly Oil Co. Stanolind Oil and Gas Co., also a producer in the area, recently extended the field several miles west by discoveries in Stanton County, Kansas.

Tennessee Enamel Appoints McCann-Erickson

W. B. Evans, president of the Tennessee Enamel Manufacturing Co., Nashville, announces the appointment of McCann-Erickson, Inc., of Cleveland, as advertising agency. The company manufactures gas-fired floor furnaces, space heaters and Porcelain Enamel signs and table tops.

Under direction of Frank Drake, advertising manager, work is now going forward on a complete program of advertising and sales promotion, concentrated on floor furnaces, and space heaters.

Central Electric & Gas Co. Buys Nebraska Light & Power

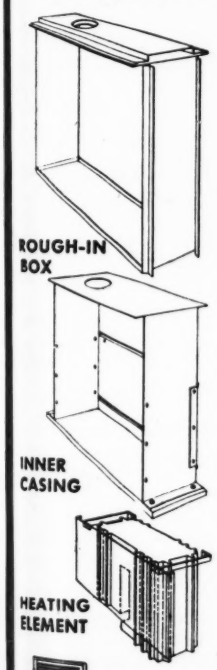
The Central Electric & Gas Co., Sioux Falls, So. Dakota, announces its acquisition on Feb. 27 of the remaining gas properties of the Iowa-Nebraska Light & Power Co., which provide natural gas service in 38 communities including Lincoln and Beatrice and manufactured gas service at Norfolk. L. R. King will continue as president of Nebraska Light & Power.

Court Injunction Lifted

The Nebraska Supreme Court has vacated a court injunction which since 1943 has prevented the People's Power Commission from negotiating the purchase of Nebraska Power Co. for the city of Omaha.

Sell HAMMEL

DUAL WALL HEATERS



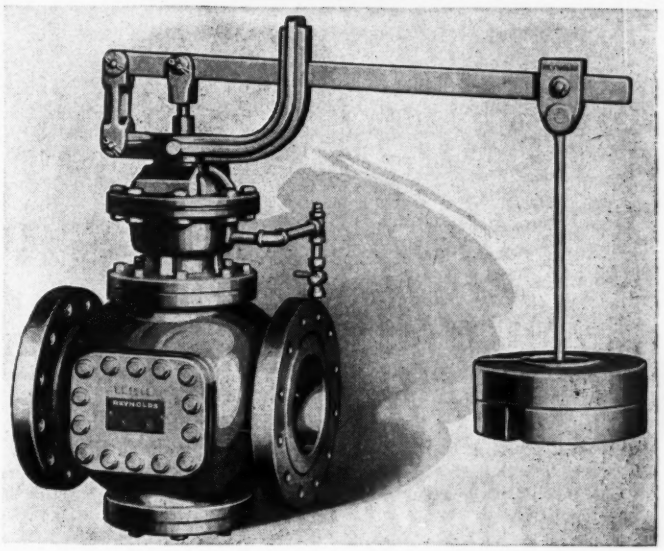
Your customers will demand increased comfort and convenience in heating equipment after the war. They want livability, beauty and safety. And, that's what you provide when you sell a Hammel Dual Wall Heater. It's a gas-fired, fully vented heater for installation in the wall between rooms. Provides comfortable warmth throughout the home.

The heating element completely encloses the flame and by radiation heats the circulating air. Three sizes available for 4-, 8- or 16-inch wall thicknesses.

You'll want to know all the sales-making advantages of this Hammel heater; write for catalog.

Hammel
RADIATOR ENGINEERING CO.
A. S. Martinson & Associates
Successors to Hammel Radiator Corp.
3348 Motor Ave. SINCE 1912 Los Angeles 34

REYNOLDS
HIGH PRESSURE REGULATOR
Gives Wide Delivery Range



● REYNOLDS New High Pressure Line Regulators, (known as K. Series), without auxiliary bowl, feature a wider range of delivery pressure control (2 lbs. to 100 lbs.), by use of four interchangeable diaphragm cases. It is manufactured in 2″ to 16″ sizes with cast iron, cast steel or bronze body, and a swivel head that simplifies installation in different shaped spaces. The valves in this unit can be replaced while the regulator is in the pipe line. Also, this regulator is available in pilot operated or pilot loaded construction with a choice of composition or metal seats. The K. T. Series with internal toggle levers can also be furnished. In addition, Reynolds builds High Pressure Line Regulators with auxiliary bowl, when complete lock-up is required.

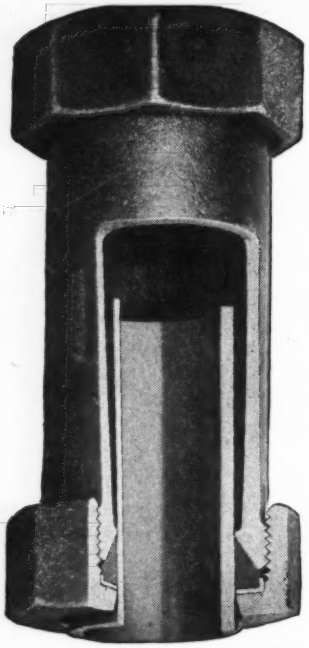
REPRESENTATIVES:
Eastern Appliance Company
Boston, Massachusetts
Wm. A. Ehlers, No. 268 Park St.,
Upper Montclair, New Jersey

BRANCH OFFICES:
423 Dwight Bldg.,
Kansas City, Mo.
2nd Unit, Sante Fe Bldg.,
Dallas, Texas

• GAS CONTROL SINCE 1892 •

REYNOLDS GAS REGULATOR CO.
ANDERSON, INDIANA, U. S. A.

NORMAC COUPLINGS, SLEEVES AND FITTINGS



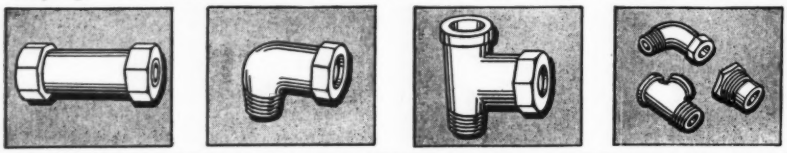
for maximum deflection, ease of "stabbing," complete confinement of the rubber!

So close are "Normac" rubbers confined at the gasket tip that possibility of flow is reduced almost to "nil." These couplings, sleeves and fittings . . . approved by gas utility men across the country for their time-saving features, ease of handling and dependable service . . . are available in a complete range of sizes. Made from air furnace malleable iron they provide greater wall thickness than pipe on which used.

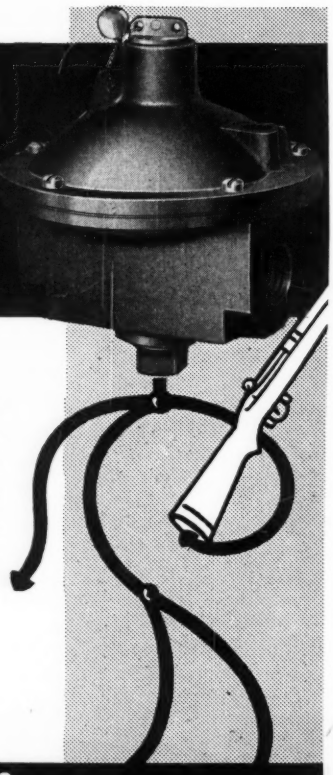
Send for complete catalog.

NORTON-McMURRAY
MANUFACTURING COMPANY
39 South La Salle St. Chicago, Ill.

Couplings - Meter Bars - Sleeves - Cocks - Bell Joint Clamps - Service Tees & Ells



STANDING GUARD FOR *Economy*



Precision engineered for sturdiness, long life, and trouble-free service, the H-M Low Pressure Regulator saves labor and money. Regulating and controlling your gas flow through the use of H-M Regulators you can solve your pressure problem.

Send for complete details regarding available sizes and specifications.

HM REGULATOR CO.
THERMO CONTROL CO.
800 EAST 108TH STREET
LOS ANGELES 2, CALIF.

BOOKS AND PAMPHLETS

Federal Power Commission Reports, Volume III, an 1180-page buckram-bound volume, was issued by the Commission March 14. The volume presents opinions and decisions of the Commission from Jan. 1, 1942 to Sept. 30, 1943, with an appendix of selected orders in the nature of opinions. The new volume is uniform with the first two.

Volume I contains all the formal opinions and accompanying orders, and selected orders in the nature of opinions, issued by FPC from Jan. 1, 1931 to June 30, 1939, and Volume II comprises the same material from July 1, 1939 to Dec. 31, 1941.

Volume III includes a 69-page digest and index, sells at $2.25 by FPC or by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Volumes I and II are available from the same sources at $1.50 and $1.75 a copy respectively.

Modern Stores—a manual published by the National Retail Furniture Association. Suggestions and basic ideas for modernizing a store when construction is again permissible, are outlined. The manual discusses installation of store fronts, interior designs, window displays and back-grounds, physical equipment which include air conditioning, heating, lighting, elevator service and office equipment, advancing the ideas of some of the nation's leading commercial architects as well as those coming from the research laboratories of industry. Information may be obtained by writing the National Retail Furniture Association, Furniture Mart, Chicago.

• **Basics of Supervision:** By H. W. Heinrich. Safety Engineering Division of Alfred M. Best Co., Inc., 75 Fulton Street, New York 7, N. Y., 1944. XV 180 pages. 17 illustrations. $3.00.

The text of "Basics of Supervision" is constructed about the tested pedagogical "Rule of Four". Under each of the four cardinal essentials of supervision, (attitudes, abilities, knowledge and action) is a further breakdown of four component fundamentals. The resulting entire chain of 16 basic factors and their relation to one another are explained one by one in simple, concise, narrative style.

The Future of Industrial Research—an address given by Dr. Thomas Midgley, Jr., late vice president of the Ohio State University Research Foundation. Reprints of the address are available through the Standard Oil Co., (New Jersey), Room 1626, 30 Rockefeller Plaza, New York 20, N. Y.

The Right of a Lessee Under An Oil, Gas and Mineral Lease to Remove Casing From an Abandoned Well—by Leslie Moses, formerly of the New Orleans Bar. Now secretary and counsel, Fohs Oil Co., Houston.

N.A.M. Survey of Employment and Reconversion—Analysis of replies to N.A.M. questionnaire, with charts attached. Prepared by research department, National Association of Manufacturers, 14 West 49th Street, New York 20.

Secondary Recovery Bill Sought in Oklahoma

ELEMENTS of the oil and gas industry who believe that several dormant or slowly dying oil and gas fields in Oklahoma could be revived through unitized management, with ultimate recovery of many million barrels of oil which otherwise would be lost have been making an unsuccessful fight in the past three sessions of the Oklahoma Legislature for passage of secondary recovery legislation.

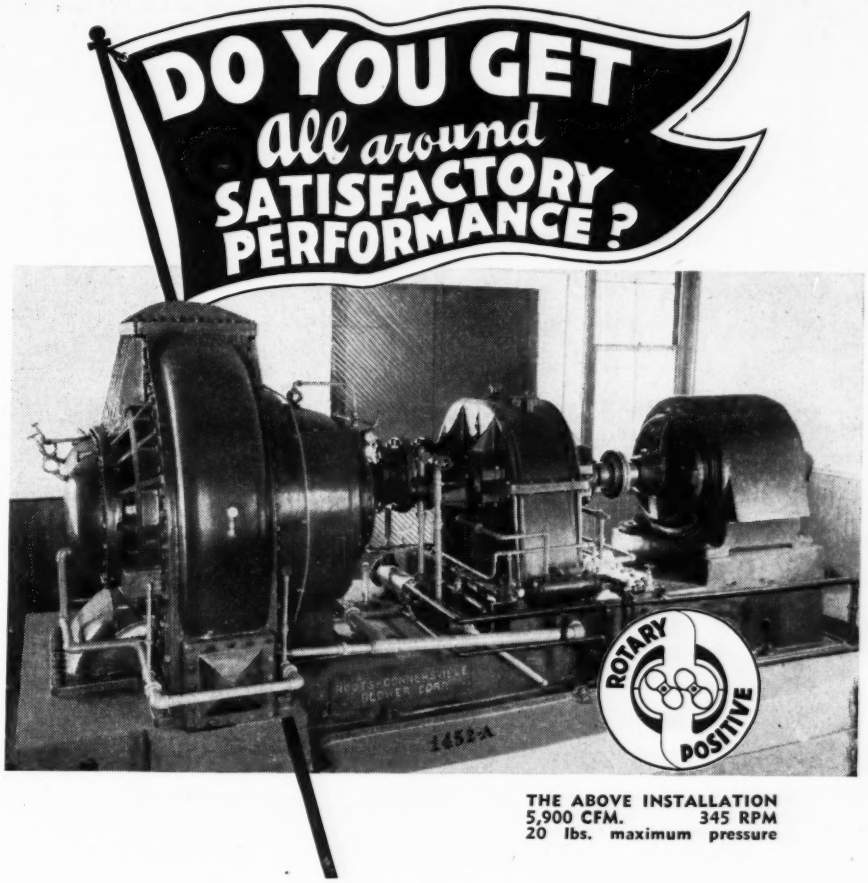
In the present session House Bill 333 by Arrington and others, goes farther than preceding proposed measures by prescribing methods and procedure for both primary and secondary recovery. The theory back of this bill, which its authors claim has been proved by best engineering practices, is to start re-pressuring, cycling, water flooding or other conservation methods before the natural pressure in an oil and gas field is seriously reduced, thus postponing the time, possibly for years, when the field will have to go on pumps, and thereby greatly increasing ultimate recovery.

Several hearings already have been held on the Oklahoma bill by the oil and gas committee of the House, to which the measure was referred. Advocates of the procedure express the substance of their position in the following legislature declaration in Section 1 of the bill, which reads:

"The Legislature finds and determines that it is desirable and necessary, in the interest of public welfare, under the circumstances and for the purpose hereinafter set out, to authorize and provide for unitized management, operation, and further development of contiguous oil and gas properties within this state, to the end that a greater ultimate recovery of oil and gas may be had therefrom, waste prevented, and the correlative rights of the owners in a fuller and more beneficial enjoyment of the oil and gas rights protected."

The Oklahoma Corporation Commission is vested with jurisdiction in the bill, to promulgate rules and regulations governing unitized management efforts, to carry on pressure-maintenance, repressuring, cycling, or water flooding operations, or any combination of these methods, to increase recovery from any common source of supply.

Opponents of the bill, some of them independent oil and gas operators and royalty owners, contend that the measure would destroy private property rights and give the Corporation Commission power to appoint unit management from any source the body saw fit.



THE ABOVE INSTALLATION
5,900 CFM. 345 RPM
20 lbs. maximum pressure

You protect your capital investment and best solve your gas handling problems when the equipment selected has all five of of these characteristics:

1. **"Engineered-to-the-job Design."**
2. **Economical Operation.**
3. **Minimum Attention Requirements.**
4. **Extra-long Life.**
5. **Sustained High Efficiency.**

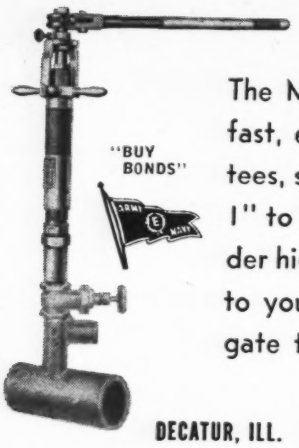
When you invest in Roots-Connersville Rotary Positive Exhausters or Boosters, you *know* you will get all five of these characteristics, which insure all-around satisfaction. "R-C" equipment is built to give this type of service, and countless performance records prove they *do* give it.

ROOTS-CONNERSVILLE BLOWER CORP.
ONE OF THE DRESSER INDUSTRIES
504 Oregon Avenue Connersville, Indiana

Roots CONNERSVILLE SINCE 1854

WRITE FOR BULLETIN 32-33-B-12

Rotary Positive GAS PUMPS and BOOSTERS



SECURE GOOD EQUIPMENT

The MUELLER "D-4" Machine is unequalled for fast, economical drilling when used with welding tees, service clamps, and other fittings. Capacity 1" to 2" inclusive. Absolutely safe for drilling under high pressure. No gas can escape. No danger to your men. No shut-down necessary. Investigate the MUELLER "D-4" Drilling Machine.

DECATUR, ILL. **MUELLER CO.** LOS ANGELES, CALIF.

SKINNER Leak Clamps Saddles

M. B. SKINNER CO.
SOUTH BEND, IND.

CLAMPS AND SADDLES FOR CAST IRON AND STEEL PIPE. STANDARD OF THE WORLD FOR NEARLY HALF A CENTURY

IT'S LIKE *writing* A LETTER HOME

These ads month after month . . . telling you that all of our production is going to war . . . are simply to remind you that the name to remember when you want real snap-acting gas controls after the war is

SPENCER THERMOSTAT CO. KLIXON ATTLEBORO, MASS.

SEMET-SOLVAY ENGINEERING CORPORATION

Blue Gas Plants	Gas Purifiers
Water Gas Machines	Condensers
Washer Coolers	Waste Heat Boilers
Naphthalene Scrubbers	Producer Gas Plants

40 RECTOR STREET, NEW YORK, N. Y.

Citizens Gas & Coke Lets Contract for Coke Ovens

Citizens Gas and Coke Utility, Indianapolis, has announced the letting of a contract to the Willputte Coke Oven Corp. of New York, for the construction of a new battery of coke ovens consisting of 47 combination, underjet, by-product ovens. Cost will be $1,641,000, to be paid out of accumulated reserves. The utility will also construct a three-unit producer plant to supply oven underfiring fuel at the Prospect Street Plant, at a cost of $623,000.

It is expected that the new units will be in operation by Jan. 1, 1946, if materials, labor, circumstances and conditions permit.

Battery "E", which the new ovens will replace, was built in 1918 and has seen more than 27 years of service. Technological advances in coke oven construction since 1918 make it possible to replace this battery of 40 ovens with a new battery of 47 ovens, thus increasing capacity by 17%. The three-unit producer plant will supply low Btu gas for underfiring the new battery and battery "H" built in 1941.

The construction of a 12 million cu. ft. holder in March, 1941 and the addition of a new battery of coke ovens in October, 1941 have made uninterrupted operation possible.

Compared with 1935, 1944 figures show tremendous increases: Industrial gas consumption is up 600%, a 40% increase in domestic consumers (reaching 108,621 meters in service) resulted in a domestic gas consumption increase of 82%. Total gas consumption in 1944 compared with 1935 was up 140%.

City of St. Petersburg to Build 2,000,000 Cu. Ft. Holder

In order to serve 10,000 additional customers, the city of St. Petersburg, Fla., plans the construction of a 2,000,000 cu. ft. holder for gas storage, as recommended by Ford, Bacon and Davis, New York, in a recent survey. The report recommended also an immediate expenditure of from $350,000 to $400,000 to boost the city's plant to full capacity and make it feasible to serve from 2000 to 3000 additional consumers. It was said that, ultimately, $1,500,000 should be laid out to equip the plant to service 10,000 additional customers.

Kentucky Natural Seeks Acquisition of Subsidiary

Kentucky Natural Gas Corp., Owensboro, Ky. has applied to FPC for a certificate of public convenience and necessity to acquire the assets and natural gas facilities of its wholly-owned subsidiary, the Universal Gas Co., also of Owensboro. The facilities consist principally of 80.45 miles of natural gas pipeline ranging in size from 2-in. to 10-in.

Surface Combustion Purchases Columbus Plant

In preparation for substantial increases in postwar employment and production on Janitrol heating equipment. Surface combustion, Toledo, O., has purchased the building adjacent to its Columbus factory.

The newly-acquired building adds 130,000 sq. ft. doubling production space.

Cold Wave Brings Heaviest Southern California Peak

The month of March brought the season's heaviest rains, coldest weather and the biggest gas loads in the history of the gas industry in Southern California. The new La Goleta line, in service since the first of the year, was called upon throughout the period and a total of 110 million cu. ft. was delivered through this line on Feb. 28.

The biggest peak day requirements ever experienced in Southern California, according to Roy M. Bauer, gas supply supervisor of the Southern Counties Gas Co., Los Angeles, occurred on Wednesday, Feb. 28, when the total potential demand for the system was estimated as approaching 900 million cu. ft. Actual sendout was in the neighborhood of 675 million cu. ft.

A second peak day occurred on Sunday, March 4, when, with cold rains falling in the lowlands and several feet of snow piling up in the mountains, domestic users made the heaviest demands for any Sunday in history. Extensive curtailment of service to surplus industrial consumers throughout the stormy period, was necessary in order to supply domestic and essential war industrial users, Bauer said.

No trouble from storm damage was experienced anywhere along the lines and the gas companies were able to meet the demands without difficulty.

Consolidated Edison's O'Connell Plant Shut Down

After manufacturing gas on Manhattan Island for 120 years, Consolidated Edison Co. of New York, March 1, shut down the last remaining facilities for making gas in the borough—the O'Connell Plant. Metropolitan Life Insurance Co. has purchased the site for a postwar housing development. Manhattan consumers will continue to be served by the Astoria and Hunts Point plants, two of the world's largest and most modern works.

With the passing of the O'Connell Plant, which went into operation early in 1849, will go one of New York's unique institutions, the gas house district, famous in Manhattan song and story for more than a century.

The plant was named for John O'Connell in 1929, who, coming to the 21st Street plant at the age of 17, worked there 72 years until his death at the age of 89. He worked up through the various grades at the works, becoming foreman in 1880, later general foreman, the title he held at his death in 1928.

Cabot Carbon To Expand Guymon, Okla. Plant

The Cabot Carbon Co., of Pampa, Texas, is expanding its carbon black manufacturing capacity in Guymon, Okla., through expenditure of $1,109,278 in additional construction. This is part of a $3,154,478 expansion of facilities, George L. Noble, Jr., regional war production board director, Dallas, stated.

Production of carbon black, an important basic material in manufacture of synthetic rubber for tires, urgently needed at the battle fronts, is now falling 14,000,000 lbs. a month short of requirements. Because of this the WPB recently ordered drastic restrictions in use of carbon black in rubber and kindred industries until the 1945 goal of 1,255,000,000 lbs. can be reached.

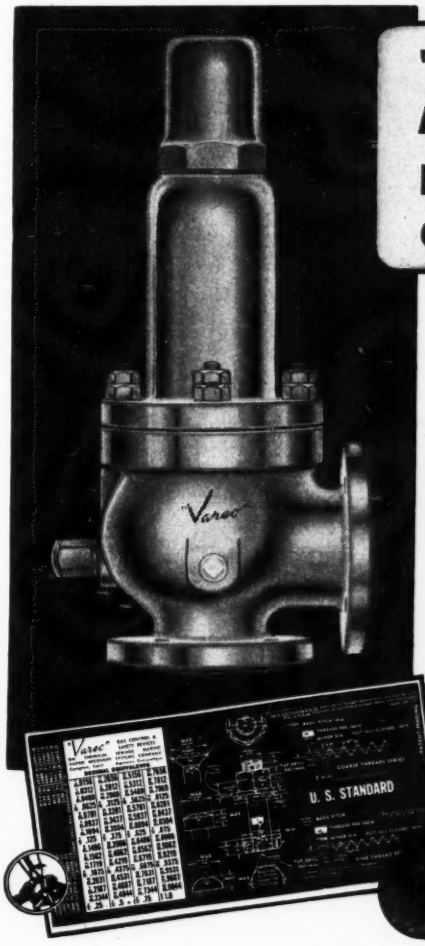
Where Familiarity Breeds PRECISION

INTRICATE PARTS—31 of them—go into every Domestic Thermostat. Each part is precision made. Each is handled by expert familiar hands that constantly test as they assemble. Dependability is the result.

That's why we can say that every Domestic equipped water heater means a better satisfied customer for you.

Domestic
WATER HEATER THERMOSTATS
AUTOMATIC PILOTS
ROOM THERMOSTATS

DOMESTIC THERMOSTAT COMPANY • 156 W. Pico Blvd., Los Angeles 15, Calif.



"VAREC" approved
ANGLE RELIEF VALVES
HAVE *Greater*
CAPACITIES

"VAREC" top-guided Valve Plug design insures greater "free-flow" capacities. Rugged durability of "VAREC" approved Angle Relief Valves assures greater efficiency and performance in Water, Oil, Air, Steam, or Gas Service. They are designed especially for handling temperatures and pressures encountered in Chemical, Gas, and Petroleum operations where positive, dependable action is demanded. These Valves are the pressure-tight, regrinding type, equipped with "VAREC" patented Hyperbolic Inner Valves insuring minimum "blow-down." They feature a high lifting force against valve plug, an unrestricted flow, and an accurate spring action. Various sizes, combinations of sizes, materials, and pressures guarantee "tailor made" performances demanded by engineers' specifications.

Free WITH COMPLIMENTS OF "VAREC"

Use "VAREC" Slide to obtain U.S. Standard dimensions for coarse and fine thread series, U.S. Standard (and other commercial sizes) Woodruff Keys, and American Standard Pipe Threads, plus decimal equivalents, millimeters into inches, and other pertinent engineering data.

The Pace Setter Since 1928

THE VAPOR RECOVERY SYSTEMS COMPANY
Manufacturers of Gas Control and Tank Equipment
COMPTON, CALIFORNIA
New York City · New Orleans, La. · Houston, Texas
Tulsa, Okla. · Agencies Everywhere

Production testing of automatic oxygen regulators.

New War Contracts Under Way at Laboratories

THE A.G.A. Testing Laboratories are now making deliveries to the Army Air Forces of an improved type of automatic, continuous flow oxygen regulator used in troop transport planes.

The regulators, designed and engineered cooperatively by the Laboratories and Alar Products, Inc., supply oxygen to airborne personnel at high altitudes such as those encountered in flying over the famed "hump" of Indo-China. Previous experience in supplying the original design under an earlier contract made it possible for the Laboratories to undertake their new assignment in a minimum of time. Technical changes and refinements incorporated in the present model have resulted in improved performance and at the same time have been engineered so that complete interchangeability of parts with the previous design is possible, thus simplifying field maintenance and servicing.

In addition to the contract for these regulators, a second is being handled for the reinspection and retesting of regulators that have been in storage for one year or more. In preparation for both contracts it was necessary to design and construct equipment and facilities for testing and inspection and to train new personnel. New test benches for oxygen flow and for leakage were built and a new cold box designed for application of additional tests which call for performance checking under more severe operating conditions than previously specified.

Through preparation of facilities and training of personnel for the reinspection contract, the Laboratories were able to start work on the new type regulator without delay, new designs and drawings having been prepared in advance. Likewise completed are a new service handbook and installation instructions for use of airforce personnel. Reports from former employees now in military service, who have seen these oxygen regulators in use, indicate that they are performing a vital function in the air of which we may well be proud.

AWARDS

• **George M. Clark and Co.,** Division of **American Stove Co.,** Harvey, Ill., has been awarded the Army-Navy "E" Pennant. The company makes fragmentation bombs and field kitchens.

• **The Tappan Stove Co.,** Mansfield, Ohio, has been awarded a third renewal of the Army-Navy "E" flag, according to an announcement by Paul R. Tappan, president, following receipt of a letter from Admiral C. C. Bloch, chairman of the navy board for production awards.

• **Surface Combustion Co.,** Toledo, Ohio was awarded the Army-Navy "E" on March 8, for development and production of heat treating furnaces contributing to the firepower of the armed forces.

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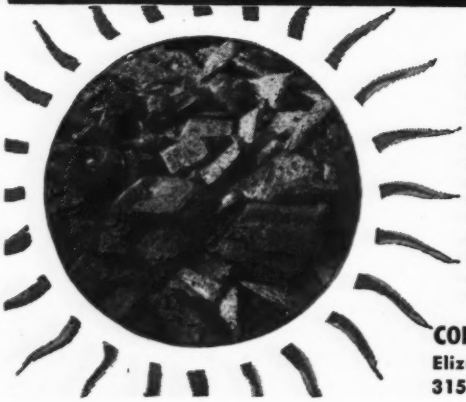

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